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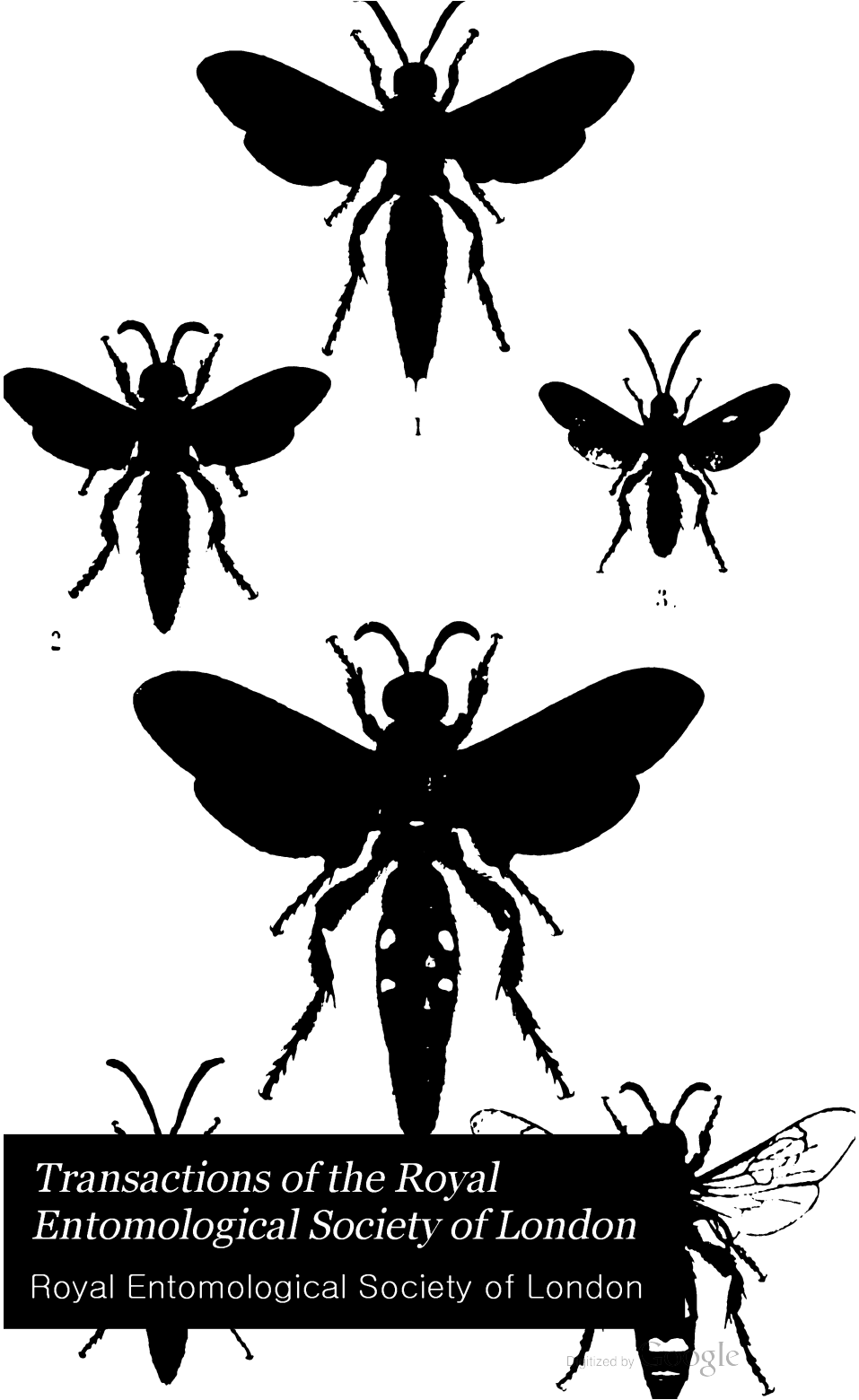

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ERRATA.

TRANSACTIONS.

Page 352, for *Polyrhachis Schrinax* read *Polyrhachis thrinax*.

,, 366, for "see their bodies," read "see these bodies."

,, 366, for "carrying off the body," read "carrying off the booty."

,, 373, for "Entom. Trans. of March, 1865," read "Entom. Trans. of March, 1875."

,, 367, for *Holcomyrmex indicus*, read *Holcomyrmex scabriceps*, Mayr.

Plate XII. For "New Lepidoptera from the Solomon Islands" read "New Lepidoptera from the Solomon Islands and East Africa."

PROCEEDINGS.

Page xiv, line 5 from bottom of page, for "states" read "stated."

,, xxii, line 32 from top of page, after the word "took" read "part."

,, lvi, line 8 from bottom of page, after "6." read "*Psocidæ*."

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THE

TRANSACTIONS

OF THE

ENTOMOLOGICAL SOCIETY

OF

LONDON

FOR THE YEAR 1889.

I. *Monograph of the genera connecting* Tinægeria, *Wlk.*, *with* Eretmocera, *Z.* By The Right Hon. Lord WALSINGHAM, M.A., F.R.S., F.L.S., &c.

[Read December 5th, 1888.]

PLATES I., II., III., IV., V., & VI.

THE object of the present paper is to collect and arrange material for a study of certain genera of Micro-Lepidoptera, about the classification of which various opinions have already been expressed by different authors who have alluded to the subject.

The genera here presented for study are as follows:—

Tinægeria, Wlk.
Snellenia, Wlsm.
Pseudægeria, Wlsm.
Œdematopoda, Z.
Eretmocera, Z.

A careful and critical examination of their structure and affinities seems to disclose gradual modification, and to suggest that they are connected with each other

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by characters not jointly possessed by any other genera of those families or subfamilies in which they have hitherto been classed.

The species examined are those in the British Museum and in the Zeller collections, and especially a fine series of specimens in my own cabinet, for which I am indebted to Mr. G. T. Carter, Mr. F. J. Jackson, Mr. J. H. Leech, and Mr. H. Druce.

The question of classification has been touched upon under the various descriptions of species by Zeller, by Staudinger, by Walker, by Stainton, and by Meyrick; also at more length by Butler in a paper entitled "On the natural affinities of the lepidopterous family *Ægeriidæ*" (Trans. Ent. Soc. Lond., 1878, pp. 121—5, Plate V.).

Zeller regarded *Eretmocera* (including *Œdematopoda*) as forming a connecting-link between that section of the unrestricted genus *Œcophora*, which included *esperellum*, Hb., *seleniellum*, Z., and *chenopodiellum*, Hb. (now associated with *Butalis*, Tr.), and the equally unrestricted genus *Elachista*, as represented by the species *æratella*, Z., *modestella*, Dp., &c. Staudinger, in describing his *Staintonia medinella*, states his opinion that it comes nearest to *Butalis*.

Walker, in the British Museum Catalogue, makes some very significant remarks. Of *Tinægeria* he writes, "this genus seems to connect the *Tineites* with the *Ægeriidæ*"; of *Arauzona* he writes, "this genus seems to connect the *Ægeriidæ* with the *Gelechidæ*." He further places *impactella* in the genus *Gelechia*, and says "this species appears to have some affinity to the *Ægeriidæ*."

Stainton remarks of his *Atkinsonia*, "a singular and beautiful genus belonging to the family *Elachistidæ*," and mentions its habit, when at rest, of erecting its hind legs above its back behind the head (as in *Shreckensteinia* and *Heliodines*, Stn.), and vibrating its plumed antennæ. He also notes the larval habits (which are similar to those of many species of *Butalis*). Moreover, in his '*Tineina* of Southern Europe,' he places *Staintonia* between *Endrosis* and *Schreckensteinia*, where it stands also in Staudinger and Wocke's Catalogue.

Meyrick classifies *Castorura* with the *Elachistidæ*, and Butler draws attention to the affinities with the *Ægeriidæ*

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of *Tinægeria*, *Arauzona*, and *Acridura*, and remarks that *Acridura* combines "the characters of the clear wings with those of the *Pyrales* and *Gelechiidæ*." He further states that, "A careful study of all the genera which seem to be allied to *Acridura* has manifested a gradation of structure from the *Ægeriidæ* to the *Pyrales*, on the one hand, and from the *Ægeriidæ* to the *Gelechiidæ* on the other." He goes on to say:—"The difficulty of pointing out the resemblance of the *Ægeriidæ* to the *Gelechiidæ* is nothing to that of determining where the line of demarcation between the two families is to be drawn: thus *Tinægeria* is apparently a small form of *Ægeriid* with long, slender-curved palpi, and a hairy second joint to its antennæ; it is without doubt allied to *Arauzona* and to *Acridura*, less nearly to *Tinthia*, which is close to *Ægeria;* on the other hand, the Gelechiid genus *Exodomorpha* (*Staintonia*, Staud.) is evidently the African representative of the New World genus *Tinægeria;* indeed, I have hitherto only found one structural character to distinguish them by, namely, the form of the secondaries; yet *Exodomorpha* chiefly differs from *Gelechia* in the hairy second joint to its antennæ, and the non-indented apex of its posterior wings."

Thus it will be seen that in the case of *Eretmocera* (shown in this paper to represent *Exodomorpha*, *Staintonia*, and *Castorura*), Zeller, Staudinger, Stainton, and Meyrick recognise its affinity to the *Elachistidæ;* while Walker and Butler agree with each other in referring it to the *Gelechiidæ*, and in pointing out its connection with the *Ægeriidæ*, with which Butler also connects the *Pyrales*.

It should be borne in mind that the family regarded by Walker as *Gelechiidæ* included the genus *Butalis*, since referred to the *Elachistidæ*. Thus Walker's opinion was not at variance with those of Zeller, Staudinger, Stainton, and Meyrick.

Mr. Butler can scarcely have intended to include *Butalis*, or any other genus of the now generally recognised *Elachistidæ* in the term *Gelechiidæ*, for he expressly mentions the indented hind wings of that family, a character not exhibited by *Butalis* or its allies.

In the case of *Œdematopoda* (shown here to equal *Atkinsonia*), Zeller and Stainton also agree in referring

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it to the neighbourhood of *Butalis* or the *Elachistidæ*: and in the case of *Tinægeria*, Walker and Butler again agree that the genus seems to connect the *Ægeriidæ* with certain families of the *Tineites*. Felder and Rogenhofer place the type of the genus with a "?" in *Eretmocera*, and a specimen in my own collection, received from Mr. G. F. Mathew, was named by Mr. Meyrick before I received it, "*Atkinsonia lineata*, Walk.," showing that all these authorities concur in classing *Tinægeria* with the *Tineites* (*Tineina*, Stn.).

I am unable to regard the genus *Acridura* as allied to any of the genera here mentioned; its long, slender, and pointed abdomen, its Pyralidiform wings and neuration, and certainly its general appearance, seem to separate it very widely from *Tinægeria* at the one end, as well as from *Œdematopoda* and *Eretmocera* at the other end of our proposed series.

The more important structural characters of the genera included in this paper are as follows:—

1. Antennæ thickly clothed with more or less long projecting scales, extending to a greater or less distance along them.

2. A greater or less tendency to transparency in the hind wings.

3. Legs often more or less clothed with projecting scales upon or above the strong spurs.

4. Bodies usually flattened, frequently brightly coloured, and with strong lateral scales.

4. Fore wings narrow, elongate, the costal and dorsal margins nearly straight, and parallel to beyond the middle; the apex depressed.

If any affinity to the *Ægeriidæ* can be supposed to exist in this group of genera, the species having transparent hind wings may be regarded as in this respect showing less departure from the characters of that family than others with opaque hind wings. For this reason, as a matter of convenience in classification rather than as an arbitrary assertion of a supposed physiological fact, however probable, I have here ranged the genera according to their degree of approach in structure and appearance to the "*Ægeriidæ*." They seem to present a gradual and well-marked departure from the typical form of that family by modifications traceable step by step throughout the series, but it should be

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observed that they all differ from them in their longer recurved palpi.

First, it should be remarked that the structure of the antennæ is approximately uniform throughout the series here noticed; the variation occurs in the nature and amount of scale-clothing only. Butler's observations as to the long hairy second joint in the antennæ of *Tinægeria* and *Exodomorpha* are incorrect, inasmuch as not the second joint only, but the whole basal portion of the antennæ to near or beyond the middle, consisting of from thirty to forty joints, is thickly clothed, more densely in the female than in the male, no one joint being noticeably longer than the others.

The amount of transparency in the hind wings is most noticeable in *Tinægeria*, gradually diminishing in *Snellenia*, confined to the extreme abdominal angle in *Œdematopoda*, and barely traceable in *Eretmocera*.

The scaling of the legs and spurs reaches its highest development in *Snellenia latipes*, originally placed by Walker in *Tinægeria;* it is also very noticeable in *Œdematopoda;* the spurs of *Œ. clerodendronella* are so thickly clothed as to have been taken for tufts of scales by Stainton when describing the species. This character almost disappears in *Eretmocera*, but the spurs are well-developed, and the structure of the legs sufficiently resembles those of *Œdematopoda* to point to the conclusion that its habit of elevating them above the body may be the same as described in the case of *clerodendronella*. The flattened structure of the abdomen is approximately uniform throughout the genera. The lateral scaling is traceable in *Tinægeria*, somewhat more developed in *Œdematopoda* and *Snellenia*, and strongest in *Eretmocera;* the anal tuft is always well-developed.

We now come to the shape and neuration of the wings, a character in which a gradual change is also noticeable. The narrow elongate fore wings are present throughout the group, but the neuration differs perceptibly, and the form of the hind wings is not entirely consistent; *Tinægeria*, as here limited, standing somewhat apart from the other genera, except *Pseudægeria*, in having the abdominal margin of the hind wing bulged towards the middle, giving the wing a wider appearance, and agreeing in this respect with the genus *Dasycera*, which also possesses the narrow fore wings, clothed antennæ, and slender recurved palpi characteristic of this genus. I

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should be inclined to admit that some natural affinity may exist between them, but I doubt if it can be held to break the chain connecting *Tinægeria* with *Eretmocera*, nor do I think it forms a true link in that connection.

The hind wings of *Snellenia*, in which I have included *S. latipes*, originally placed by Walker in his genus *Tinægeria*, are narrow, with the margins nearly parallel, and the apex rounded. In *Œdematopoda* and *Eretmocera* the hind wings are pointed, but the neuration shows gradual progression from the one to the other. In *Tinægeria*, *Snellenia*, and *Pseudægeria* the discal cell in both fore and hind wings is somewhat square at the outer extremity. In *Œdematopoda* it is square in the fore wings and pointed in the hind wings, and in *Eretmocera* it is pointed in both fore and hind wings. The apical vein of the fore wings is forked throughout. An additional link in the chain of connection appears in the labial palpi; these, in *Œdematopoda*, are very slender and strongly recurved, in this respect nearly approaching *Tinægeria*, whereas, in the form of the hind wings, it appears to be more nearly allied to *Eretmocera*, of which Zeller regarded it as a subgenus.

It is unfortunate that so far little or nothing is known of the larval habits of these insects. Stainton describes the larva of *Œ. clerodendronella* as feeding in webs on shoots of *Clerodendron*. *E. medinella* is only known to frequent the flowers of *Umbelliferæ* in Spain (*teste* Stdgr.) and *Senecio* in Persia (*teste* Christoph.); and Mr. G. T. Carter, who has watched the habits of three or four species of *Eretmocera* flying in October at Bathurst, and at Accra in West Africa, although he has at present failed to discover their larvæ, has supplied me with a sketch of the plant which they habitually frequent, somewhat resembling *Clerodendron*, and possibly referable to one of the African species of *Verbenaceæ*. The flowers of these shrubs, like the hind wings of many species of *Eretmocera*, are often scarlet or crimson, and they flower about the time of year at which the specimens were taken.

It is certainly worthy of a passing notice that the geographical distribution of the genus *Clerodendron* coincides somewhat remarkably with what is known of the distribution of the genera mentioned here; but it would be obviously unsafe to found any argument in favour of their affinity to each other on such slender grounds. The parallel may be a mere coincidence.

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Habitat.		*Clerodendron*
Africa	.....	*myrocoides* (Trop. Afr.)
S. Africa....	*Eretmocera derogatella*, Wlk. ,, *fuscipennis*, Z. ,, *lætissima*, Z. ,, *lunifera*, Z. ,, *miniata*, Wlsm. ,, *scatospila*, Z. *Œdematopoda princeps*, Z.	
W. Africa ..	*Eretmocera basistrigata*, Wlsm. ,, *carteri*, Wlsm. ,, *fuscipennis*, Z. ,, *lætissima*, Z. ,, *scatospila*, Z.	*scandens.* *splendens.* *thompsonæ.*
E. Africa (Zanzibar)	,, *derogatella*, Wlk. ,, *dorsistrigata*, Wlsm. ,, *miniata*, Wlsm.	*macrosiphon.*
Mauritius ..	.....	*hæterophyllum.* *ligustrinum.*
Europe	,, *medinella*, Stgr.	.....
Persia and Turkestan	,, *medinella*, Stgr.	.....
China	.....	*fœtidum.* *fragrans.* *seratinum.* *squamatum.*
Japan	*Œdematopoda ignipicta*, Btl. ,, *leeckii*, Wlsm.	*trichotomum.*
India	,, *clerodendronella*, Stn. Larva drawing together terminal leaves of *Clerodendron* with a white web. *Eretmocera impactella*, Wlk. *Snellenia coccinea*, Wlsm. ,, *tarsella*, Wlsm.	*fortunatum.* *hastatum.* *inermæ.* *infortunatum.* *macrophyllum.* *nutans* (Sylhet). *phlomoides.* *siphonanthus.* *viscosum.*
Ceylon	*Eretmocera impactella*, Wlk.	*infortunatum.*
Singapore ..	,, *impactella*, Wlk.	.....
Java	.....	*fallax.* *paniculatum.* *rumphianum.*
Borneo	*Snellenia bimaculata*, Wlsm.	*bethuneanum.*
Celebes	.....	*illustre.* *minahassæ.*
Australia ..	,, *lineata*, Wlk. *Eretmocera chrysias*, Meyr. *Pseudægeria squamicornis*, F. & R.	*tomentosum.* *costatum.*
Fiji	,, *squamicornis*, F. & R.	.....
S. America..	*Tinægeria basalis*, Wlk. ,, *fasciata*, Wlk. ,, *ochracea*, Wlk. *Snellenia flavipennis*, F. & R. ,, *latipes*, Wlk.	A few species chiefly natives of W. Indies and Columbia. One species broadly diffused over the maritime regions of Tropical America [*Petræa volubilis*, Vera Cruz.]

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It remains to refer to two species which have been placed by their authors in one of the genera here monographed, but which I have ventured to exclude:—

1. ? *Staintonia fulgens*, Erschoff, Hor. Soc. Ent. Ross., XII., 347, 1876.

The description is wholly inadequate to connect it with the genus *Eretmocera*, or with the group of genera to which it belongs; indeed, its shorter palpi and broader hind wings serve at once to distinguish it from them. It probably agrees with the genus *Lepidotarphius*, Pryer.

2. *Staintonia? apiciguttella*, Christoph., Bull. Soc. Imp. Nat. Mosc., LVII., 42—3 (1882) = *Butalis sinensis*, F. & R., pl. cxl., fig. 11, 1875 (n. syn.).

Of this species I have specimens in my own collection; it is almost certainly a true *Butalis*.

The changes here suggested in the generic position of certain species, and in the synonymy of the genera, require a few words of explanation.

Tinægeria has been restricted to species of which the antennæ are thickly clothed on the basal half only; these have the hind wings rather widened and almost entirely transparent. *Snellenia latipes*, originally placed in *Tinægeria* by Walker, differs from his type, *T. ochracea*, in its antennæ being clothed nearly to the ends, in its narrower hind wings with nearly parallel margins, and in the strongly-scaled spurs of the hind legs. For these reasons it has been transferred to the new genus *Snellenia*, with which it more nearly agrees. It is possible that at some future time, when more material may become available, it may be convenient to form a new genus for its reception.

Snellenia lineata, also placed by Walker in *Tinægeria*, agrees very closely in structure with *S. coccinea*, the type of *Snellenia*, but differs in its longer and more slender palpi; it differs from *Tinægeria ochracea* in the same particulars as *S. latipes*, with the exception of the strongly-scaled spurs.

After examining, in all details, the structure of *Arauzona basalis*, Walker, I am unable to discover any

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sufficient grounds for separating this species from the genus *Tinægeria.*

Œdematopoda, Zeller, possesses all the structural characters relied upon by Stainton in defining his genus *Atkinsonia;* the strong scaling of the spurs occurs again in this genus, and in this character, as in the long elevated fringe of the antennæ, it is merely a question of degree as between Zeller's and Stainton's types. *Eretmocera ignipicta*, Butler, agrees entirely with *Œdematopoda*, and is separable from the true *Eretmocera* by the shape of the discal cell in the fore wings, as well as by the characters mentioned above, which do not occur in that genus.

In Trans. Ent. Soc. Lond., 1881, p. 271, I have already pointed out that *Staintonia* and *Exodomorpha* can only be regarded as synonyms of *Eretmocera;* to these must now be added *Castorura*, Meyrick. Without committing Mr. Meyrick to any approval of the classification suggested in this paper, so far as regards the affinities of the different genera, I may mention that he quite concurs in regarding *Castorura* as identical with *Eretmocera.*

Felder and Rogenhofer figure, in the 'Reise Novara,' the following species under the name "*Eretmocera?*": —*E. æneiceps*, which is obviously *Tinægeria ochracea;* *E. sesioides*, which is certainly *Snellenia lineata;* and *E. flavipennis*, the figure of which differs from that of *sesioides* only in its more yellow colour, in the dark veining of the anterior wings being interrupted by a pale space across the middle, and in the colour of the abdomen, which in *sesioides* is figured of a uniform dark tinge, and in *flavipennis* is yellow, with the apex only of a darker colour.

The figures are not satisfactory but they indicate these points of difference with sufficient clearness; and in the letterpress the locality for *flavipennis* is "Amer.?," of *sesioides*, "Sidney." *Snellenia lineata* = *sesioides* is from Sydney, Australia, and is so labelled in the British Museum, as in my own collection; but, in describing the species, Walker states that his specimens were from "Para, Bates' coll." This, although evidently an error as regards the actual specimens now existing, seems to increase the suspicion, founded upon Felder's "Amer.?," that a somewhat similar species does occur on the

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American continent. If Felder's species was truly American, it was probably obtained by Lindig from Bogota, approximately in the same region where Bates collected.

Walker's description seems to apply to the insect figured by Felder as *Eretmocera? sesioides*, and it is probable that two of the specimens in the British Museum are rightly regarded as his types of *lineata*. These two are distinctly and separately labelled "Sidney," and as the other two specimens, to which Walker's manuscript name *Pegella ægeriella* is attached, are also both labelled "Australia," it seems impossible to account for his error in stating that his types were collected by Bates at Para.

This paper contains descriptions of two new genera and eight new species, and as it is intended as a monograph, so far as it goes, the descriptions of the known species are proposed to be republished, with such notes and additions as may serve to facilitate their recognition.

TINÆGERIA, *Wlk.* = ARAUZONA, *Wlk.*

Type. *Tinægeria ochracea*, Wlk.

Antennæ thickly clothed with long scales to half their length, thence simple. *Labial palpi* recurved, ascending, very long and slender; 2nd joint about equal in length to the apical joint, and slightly straighter. *Maxillary palpi* small, drooping. *Haustellum* long, scaled at base. *Ocelli* present. *Head and thorax* smooth. *Fore wings* elongate, the margins nearly parallel, rounded at apex; *neuration*, 12 veins, 7 and 8 from a common stem. *Hind wings* partially transparent, widened in the middle, tapering towards the base and apex, costal margin somewhat depressed beyond the middle, apex rounded, dorsal margin evenly rounded; *neuration*, 8 veins, 6 and 7 parallel, 3 and 4 separate at the base, 3 from, or near, angle of cell. *Abdomen* brightly coloured, not fringed at the edges. *Legs* with long spurs not tufted at the joints. [Wlsm.]

TINÆGERIA, *Wlk.*, Cat. Lp. Ins. B. M., VIII., 260 (1856).

Type. *Tinægeria ochracea*, Wlk.

"Corpus gracile. Proboscis brevissima.* Palpi graciles, arcuati, ascendentes, thorace non breviores. Antennæ setaceæ, graciles,

* ? fracta.—Wlsm.

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subpilosæ, corpore fere longiores. Abdomen lineare, gracile, apice non fasciculatum. Pedes graciles; tibiæ posticæ calcaribus quatuor longis. Alæ perangustæ; posticæ limpidæ.

"Body slender. Proboscis very short.* Palpi slender, curved, ascending, as long as the thorax; third joint very slender. Antennæ setaceous, slender, slightly pilose, full as long as the body. Abdomen linear, sessile, not tufted at the tip. Legs slender; hind tibiæ with four long spurs. Wings very narrow. Hind wings mostly limpid.

"This genus seems to connect the *Tineites* with the *Ægeriidæ*."

= ARAUZONA, *Wlk.*, Cat. Lp. Ins. B. M., XXXI., 25—6 (1864), (n. syn.).

Type. *Arauzona basalis*, Wlk.

"Mas.† Corpus gracile, sublineare. Proboscis longa, valida. Antennæ alis anticis paullo longiores, fimbria brevi densa munitæ, apices versus glabræ. Abdomen alas posticas longissime superans. Pedes læves, breves, robusti; tibiæ posticæ subincrassatæ, calcaribus duobus apicalibus validis. Alæ anticæ angustæ, vestitæ; posticæ vitreæ.

"Male.† Body slender, nearly linear. Proboscis long, stout. Antennæ a little longer than the fore wings, with a thick short fringe along nearly two-thirds of the length from the base. Abdomen extending for nearly its whole length beyond the hind wings. Legs short, stout, smooth; hind tibiæ slightly incrassated, with two long stout apical spurs. Wings narrow. Fore wings opaque, rounded at the tip. Hind wings vitreous.

"This genus seems to connect the *Ægeriidæ* with the *Gelechidæ*."

[Pl. i.]

♂ ♀, *ochracea*, Wlk., Cat. Lp. Ins. B. M., VIII., 260 (1856).

"Ochracea, subtus argentea; caput nigro-cyaneum; antennæ nigræ, apices versus albæ; thoracis disco et abdominis apice nigrum; alæ anticæ nigræ, basi fasciaque subapicali ochraceis; posticæ limpidæ, apud costam ochraceus, apice nigricantes.

"Ochraceous, silvery beneath. Head dark blue. Disc of the thorax and tip of the abdomen black. Fore wings black, ochra-

* ? broken.—Wlsm.

[† The palpi are missing from the type, and the specimen is unquestionably a female.—Wlsm.]

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ceous towards the base, and with an ochraceous subapical band. Length of the body, 2½ lines; of the wings, 5 lines.

"a. b. Para; from Mr. Bates' collection."

[This species is identical with *Eretmocera? æneiceps*, F. & R., from Bogota.—Wlsm.]

Antennæ yellow at the base, thence thickly clothed with dark purplish-fuscous scales to half their length, thence broadly banded with white; apical one-third purplish fuscous. *Labial palpi* recurved, long, slender, 2nd joint about equal in length to the apical joint and slightly straighter; purplish at the extreme base of the 2nd joint, the remainder of which is bright golden yellow externally, whitish internally, the apex of the 2nd joint and the apical joint tinged with fuscous. *Maxillary palpi* black. *Head* smooth, metallic-purplish; face lilac. *Thorax* shining purplish fuscous, with two golden yellow lines slightly converging posteriorly. *Fore wings* purplish fuscous, sprinkled with golden yellow scales, especially along the middle of the wing; at the base is a golden yellow band overspread at the extreme base of the costa with purple; at the outer one-fourth of the wing is an ill-defined golden yellow fascia, divided transversely by four or five narrow lines of the dark ground colour, but extending inwards at the middle and along the extreme costal margin; the cilia at the anal angle are slightly ochreous; the whole apex of the wing and the remainder of the cilia purplish fuscous. *Hind wings* transparent, except a broad band along the costal margin, which is pale straw-yellow, the veins immediately below it being marked with bright golden yellow, which also extends narrowly around the abdominal margin for one-third of the wing-length; below the apex the veins and cilia are smoky fuscous, with green and lilac iridescence upon the transparent wing-surface below them. *Under side of fore and hind wings* yellow along the basal half of the costal area, paler below and smoky fuscous beyond. *Abdomen* vermilion, with a broad black band at the anal extremity, and a greyish anal tuft. Under side yellowish. *Legs:* the upper side of the upper half of the tibiæ are tinged with vermilion on golden yellow; spurs and under side pale straw-yellow; tarsal joints broadly banded above with dark fuscous. *Exp. al.* 18 mm.

Imago.—October.

Hab. Bogota (*Lindig*), Santarem (*Mr. J. H. Leech*).

The above description is taken from a male in my collection. The specimen figured on pl. cxxxviii. of the

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'Novara Reise' is a female. Walker's types in B. M. are male and female (Wlsm.).

[Pl. vi., fig. 1.]

♂, *fasciata*, Wlk., Cat. Lp. Ins. B. M., VIII., 261 (1856).

"Nigræ; pectus albideum; abdomen ochraceum, basi et apice nigrum; pedes ochracei, nigro fasciati; alæ posticæ sublimpidæ, nigro marginatæ, apud costam testaceæ.

"Black. Pectus whitish. Abdomen ochraceous, black at the base and towards the tip. Hind wings nearly limpid, bordered with black, testaceous along the costa. Length of the body, 2½ lines; of the wings, 5 lines (= 11 mm.).

"a. Para. From Mr. Bates' collection."

[Walker's type in B. M. is a male.—Wlsm.]

•[Pl. vi., fig. 2.]

♀, *basalis*, Wlk., Cat. Lp. Ins. B. M., XXXI., 26 (1864).

"Mas.* Nigro-cuprea; antennæ fascia lata alba; thorax ochraceo-bivittatus; pectus et abdomen subtus alba; tibiæ posticæ ochraceo-fasciatæ; alæ anticæ striga basali ochracea; posticæ vitreæ, venis fimbriaque nigris.

"Male.* Blackish cupreous. Antennæ with a broad white band above on the basal half of the slender part. Thorax with an ochraceous stripe on each side. Pectus white. Abdomen white beneath. Hind tibiæ with an ochraceous band. Fore wings with a short ochraceous basal streak. Hind wings vitreous, colourless; veins and fringe black, the latter rather long. Length of the body, 3½ lines; of the wings, 8 lines (= 17 mm.).

"a. Ega. From Mr. Bates' collection."

SNELLENIA, n. g.

Type, ♂. *Snellenia coccinea*, Wlsm.

Antennæ supra dense squamatæ. Palpi ascendentes, recurvi, articulo apicali tenui, acuminato. Haustellum vestitum. Caput et thorax læves. Alæ anticæ anguste elongatæ, apice obtuso, depresso, costa ultra medium aliquot arcuata; venæ duodecim, septimo et octavo a pedicillo communi, ceteris singulis. Alæ posticæ prope basim subhyalinæ, apice rotundato, anguli abdominali distincto, marginibus costali et dorsali subparallelibus; venæ octavo, tertio et quarto a pedicillo communi. Abdomen planum,

[* This is an error; the specimen is a female.—Wlsm.]

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fasciculis lateralibus et fasciculo anali conspicuis. Pedes supra calcaria fasciculati.

Antennæ thickly fringed on the upper side, the fringes tapering to the apex. *Labial palpi* ascending, 2nd joint recurved, clothed with coarse scales; apical joint naked, slender, acuminate. *Maxillary palpi* very short. *Haustellum* thickly clothed. *Ocelli* present. *Head and thorax* smooth. *Fore wings* narrow, elongate, rounded at apex; costa arched beyond the middle, depressed before it; *neuration*, 12 veins, 2 and 3 arising from near angle of cell, 7 and 8 from a common stem. *Hind wings* semitransparent at base, rounded at apex, abdominal angle well-developed, costal and dorsal margins almost parallel; *neuration*, 8 veins, end of cell somewhat square, 3 and 4 from a common stem. *Abdomen* flattened, slightly tufted at sides, anal tuft broad and well-developed. *Legs* tufted at base of spurs, but not to the same extent as in *Atkinsonia*.

This genus differs from *Atkinsonia*, Stn., in the greater width of the hind wings, and appears to be more nearly allied to *Tinægeria*, Wlk., and *Arauzona*, Wlk., in this respect, partaking of the characters of *Dasycera*, Hw., and its allies, on the one side, and of *Stathmopoda*, Stn., *Schreckensteinia*, Hb., &c., on the other. Comparing it with undoubtedly allied genera mentioned in this paper, it seems to form a connecting-link between the so-called *Gelechidæ* and the *Elachistidæ*. I entirely agree with the opinion expressed by Mr. E. Meyrick, in a letter to me on this subject, that *Snellenia lineata*, Wlk., from New South Wales, which he regarded as probably allied to *Atkinsonia*, is nearly related to *Dasycera*; but the true *Atkinsonia* from India seems to form a distinct connecting-link between this and the African forms described by Zeller under the genera *Œdematopoda* and *Eretmocera*, which undoubtedly approach *Butalis*, Tr.

Tabulation of the species comprised in the genus *Snellenia*:—

A. Neuration of fore wings more or less outlined with dark scales.
  a. Fore wings orange-yellow.
    1. = *lineata*, Wlk.
    2. = *flavipennis*, F. & R.
  b. Fore wings red.
    1. Tarsi with white rings = *tarsella*, Wlsm.
    2. Tarsi without white rings = *coccinea*. Wlsm.

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B. Fore wing spotted or fasciate.

a. Abdomen red, with dark bar and anal segment = *latipes*, Wlk.

b. Abdomen yellow, with two dark bands = *bimaculata*, Wlsm.

[Pl. ii.]

coccinea, n. s.

Alæ anticæ cocciniæ, strigula discali post medium furcata nitide violaceo-fusca; ciliis nigrescentibus. Alæ posticæ nigræ, costa ex basi ultra medium anguste miniata. Capite, antennis, palpis, thorace, abdomine et tibiis nigris.

Antennæ black. *Palpi* black; the basal joint and inner side of lower part of 2nd joint greyish. *Head and thorax* black, the latter somewhat iridescent. *Fore wings* bright scarlet; a small spot at the base of the costa and a more elongate small space at the base of the dorsal margin black; a violaceous-fuscous metallic streak at the end of the cell, about equidistant between the costal and dorsal margins, is bifurcate outwards, and below this a few black scales are traceable along the lines of the veins which run to the lower half of the apical margin; cilia blackish. *Hind wings and cilia* black, the costal margin from the base to beyond the middle rosy pink. *Under side of fore and hind wings* bright red, the apical margin and outer half of fore wings, except the costal portion, obliquely suffused with fuscous, the hind wings with a broad fuscous border extending from the base to the apex around the abdominal and apical margins. *Abdomen and legs* black. *Exp. al.* 15 mm.

Hab. Sikkim.

A single specimen, for which I am indebted to the kindness of Mynheer P. C. T. Snellen, was collected by Mr. H. J. Elwes.

Type, ♂, Mus. Wlsm.

[Pl. vi., fig. 3.]

tarsella, n. s.

Capite nigro. Antennis nigris ultra medium late squamatis. [Palpi et abdomen desunt.] Thorace coccineo. Alis anticis coccineis, nigro venatis, margine dorsali sub plica nigrescenti. Alis posticis dilutioribus, nigro marginatis. Tibiis nigris, tarsis albo annulatis, calcaribus nigris.

Antennæ black, thickly fringed with long scales to beyond the middle. *Palpi* [missing.] *Head* black. *Thorax* deep scarlet. *Fore wings* deep scarlet, the veins marked with lines of blackish

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scales; the dorsal margin below the fold also blackish. *Hind wings* rather paler than the fore wings, a broad blackish border wider posteriorly. *Abdomen* [missing.] *Legs* black, with white rings on the tarsi, spurs and tufts black. *Exp. al.* 28 mm.

Hab. Darjeeling.

Type, ♀, B. M.

[Pl. vi., fig. 4.]

lineata, Wlk., Cat. Lp. Ins. B. M., VIII., 261 (1856).

"Nigra; palpi thorace longiores; thorax et abdomen basi ochracea; alæ anticæ ochraceo venosæ, posticæ basi luteæ.

"Black. Palpi longer than the thorax. Thorax and base of the abdomen ochraceous. Hind wings luteous towards the base. Length of the body, 2½ lines; of the wings, 5 lines (=11 mm.).

"a. b. Para. From Mr. Bates' collection."

[Walker's types are male and female. The locality Para is a mistake; the insects were purchased from Argent's collection, and are labelled "Sidney." Other specimens stand in the British Museum collection under the MS. name "*Pegella ægeriella*"; these are labelled "Australia." This species is identical with *Eretmocera? sesioides*, F. & R., also from Sydney.—Wlsm.]

flavipennis, F. & R.

♂, *Eretmocera? flavipennis*, F. & R., Reis. Nov., pl. cxxxviii., 59 (1875).

"♂, Amer. ?"

The only knowledge I have of this species is from the published figure; the shape and general appearance seem to indicate its near alliance to *Snellenia lineata*, Wlk. I should propose to include it provisionally at least in this genus.

[Pl. vi., fig. 5.]

latipes, Wlk., Cat. Lp. Ins. B. M., XXXI., 25 (1864).

"Mas. Viridis; caput subtus pectusque pallide flava; palpi basi pallide flavi; antennæ pubescentes; pedes anteriores flavo notati; tibiæ posticæ rufæ, apice nigræ, calcaribus duobus anticis fimbriatis; alæ anticæ lurido bifasciatæ; posticæ vitreæ.

"Male. Dark metallic-green. Head beneath, proboscis and pectus, pale yellow. Palpi smooth, slender, compressed, curved,

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pale yellow at the base, rising high above the vertex; third joint longer than the second. Antennæ pubescent. Coxæ mostly, and anterior femora and biæ partly pale yellow; hind tibiæ long, stout, bright red, black towards the tips; first pair of spurs red, very unequal in length, with a black fringe, which is red towards the base in the shorter spur; hind tibiæ compressed, slightly dilated and fringed along the whole length. Wings narrow, with a broad fringe. Fore wings with two lurid bands; first band near the base broader than the second, which is at two-thirds of the length. Hind wings hyaline, colourless. Length of the body, 5 lines; of the wings, 10 lines (= 21 mm.).

"a. Para. From Mr. Bates' collection."

[Pl. vi., fig. 6.]

bimaculata, Wlsm., n. s.

Antennæ yellow at the base, fringed with long deep purple scales beyond (the ends being broken off it is impossible to say how far this clothing extends). *Palpi* long, slender, recurved, yellow. *Head and thorax* smooth, shining, bronzy purple. *Fore wings* bright golden yellow, overspread with shining brownish purple at the base; the apical portion of the wing broadly brown, with a purplish lustre, this colour extending one-third along the dorsal margin; a brilliant metallic lilac spot lies at the end of the cell, and touches at its lower edge the inner extremity of the brown shading; this spot is preceded by a smaller spot of the same colour before the middle of the wing, both very conspicuous upon the golden yellow ground colour. *Hind wings* bright golden yellow, with a broad brown marginal band extending from the apex nearly to the abdominal angle, which is slightly transparent. *Abdomen* golden yellow, with a narrow brown transverse band across the middle, and a wider one of the same colour near the anal extremity. *Exp. al.* 16 mm.

Hab. Sandakan (*Mr. H. J. S. Pryer*).

Type, ♀, Mus. Wlsm.

PSEUDÆGERIA, n. g.

Type. *Ochsenheimeria? squamicornis*, F. & R.

Caput lævis. Palpi recurvi, articulo secundo æqualiter vestito, articulo apicali tenue, acuminato. Antennæ dense vestitæ, squamis elongatis, serrate congestis. Haustellum longum. Alæ anticæ elongatæ, marginalibus costali et dorsali parallelibus, apice de-

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presso; venæ apicali furcata, ceteris singulis. Alæ posticæ lanceolatæ, margine costali in medio arcuato apice obtuso, dimidio dorsali subhyalinis; venis tertia et quarta a pedicillo communi, sexta et septima simillimis. Tibiæ posteriores supra calcaria floccatæ.

Antennæ thickly clothed with erect scales from near the base, arranged in groups of unequal length, giving a strongly serrated appearance. *Palpi* recurved, 2nd and apical joints about equal in length, the former evenly clothed throughout, the latter slender, erect, acuminate. *Head and thorax* smooth. *Fore wings* elongate, margins parallel, apex depressed; *neuration*, 12 veins, 7 and 8 from a common stem, the rest separate, 3 and 4 approximate at base, 3 from or near angle of cell. *Hind wings* lanceolate, abdominal angle rather abrupt, costal margin slightly arched in the middle, somewhat widened at the anal angle; somewhat transparent about the dorsal and abdominal area; *neuration*, 8 veins, 3 and 4 from a short stem, 6 and 7 from a common point, 2 from outer third of cell. *Abdomen* somewhat flattened, fringed posteriorly with projecting lateral scales. *Legs* strongly tufted above the spurs.

[Pl. iii.]

squamicornis, F. & R.

♀, *Ochsenheimeria ? squamicornis*, F. & R., Reis. Nov., pl. cxxxix., 6 (1875).

"♀, ins. vitianæ, Australia ? (M. C.)."

Capite nigro. Thorace nigro, sparse aurantiaco squamato, patagiis rufo-aurantiacis. Palpis nigris. Antennis nigris, dentate squamatis. Alis anticis elongatis, dimidio costali rufo-aurantiaco, dorsali nigro, margine apicali usque ad apicem anguste nigro; ciliis brunneis. Alis posticis apud marginem abdominalem albide subhyalinis, apud costam dilute aurantiaco suffusis, margine dorsali late brunneo; ciliis brunneis. Abdomine antice brunneo, postice nigro, linea transversa angustissime post medium albida. Tibiis nigris, calcaribus albidis.

Antennæ thickly fringed near the base with unequal tufts of long glossy black scales with a purplish tinge, having a dentated appearance. *Palpi* black, recurved, reaching well above the head; 2nd joint evenly clothed throughout, apical joint about equal to it in length, very slender and erect. *Head and thorax* glossy black, the latter streaked with reddish orange, a collar of smooth blackish purple scales extending over the anterior margin of the thorax; patagia reddish orange. *Fore wings* reddish orange on the costal half, glossy black on the dorsal half, a narrow semi-detached black

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streak is scarcely divided from the black dorsal half, blending with it beyond the middle, the black is continued around the apical margin at the base of the cilia as far as the apex; cilia also dark, but with a slight brownish gloss. Under side pale reddish orange, suffused with brown within the anal angle. *Hind wings* whitish about the base of the abdominal margin, inclining to transparency, suffused with orange-yellow towards the costal margin, a broad band of brown along the dorsal margin towards the apex; cilia glossy brown. Under side pale reddish orange, suffused with brown around the dorsal margin. *Abdomen:* the anterior portion is dark brown, separated from the glossy black anal segments by a very narrow whitish line behind the middle, posteriorly fringed with projecting glossy brownish scales adjoining the anal tuft. Under side blackish. *Legs* glossy black, with strong tufts of scales above the spurs; spurs white. *Exp. al.* 21 mm.

Hab. Fiji (*F. & R.*), Australia (B. M.), 66, 125.

This description is taken from the British Museum specimen, which is also a ♀.—Wlsm.

ŒDEMATOPODA, *Z.* = ATKINSONIA, *Stn.*

ŒDEMATOPODA, *Z.*

Eretmocera (A) *Oedematopoda*, Z., Handl. Kong. Svensk. Ak., 1852, 96.

Type, ♀. *Œdematopoda princeps*, Z.

"*Eretmocera.*

"*Char. essent.*—Caput læve. Antennæ uno latere squamis piliformibus alatæ, apice nudo. Alæ elongatæ.

"*Char. nat.*—Antennæ uno latere dense squamato-pilosæ, pilis sensim longitudine acutis, apice nudo. Capilli appressi, fronte rotundata. Palpi labiales mediocres, recurvi, articulo terminali longiore, tenui acuto. Haustellum mediocre spirale. Alæ elongatæ ciliis longis, posteriorum angulo anali subnullo. Abdomen breviusculum, crassum, planiusculum. Pedes robusti, tibiarum spinæ longiusculæ.

"(A) *Oedematopoda.*—Antennæ apice breviter nudo, pilis longis. Pedes medii et postici in articulorum apicibus squamato-nodosi, spinis uno latere pilosis. Abdominis latera non squamis marginatum.

"Genus hoc *Oecophoræ* eam partem, quæ *esperellam*, *seleniellam*, *chenopodiellam*, etc. continet, cum *Elachistis æretella*, *modestella*, etc. conjungere videtur. Distinguitur ab utrisque antennis non

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simplicibus, sed a basi ultra medium in latere exteriore pilosis, palpis longioribus, abdomine latiore."

= ATKINSONIA, *Stn.*, Trans. Ent. Soc. Lond. (n. s.), V., 125 (1859).

Type. *Atkinsonia clerodendronella*, Stn.

"Head smooth, broad, flat; labial palpi long, slender, recurved, terminal joint rather longer than the second joint. Antennæ stout, clothed on one side with long loose scales nearly to the tip. Anterior wings broadest beyond the middle, the costa being at first slightly concave; posterior wings narrow and pointed. Abdomen broad, depressed, with long scales at the side. Legs, especially the hind pair, with long tufts of scales.

"A singular and beautiful genus, belonging to the family *Elachistidæ*."

Tabulation of the species comprised in the genus *Œdematopoda*:—

A. Fore wings yellowish, with black apex = *princeps*, Z.
B. Fore wings unicolorous.
  a. Fore wings cupreous = *clerodendronella*, Stn.
  b. Fore wings red.
    1. Head and antennæ purplish = *ignipicta*, Btl.
    2. Head and antennæ red = *leechi*, Wlsm.

[Pl. iv.]

princeps, Z., Handl. Kong. Svensk. Ak., 1852, 96—7.

"Abdomine aurantiaco, apice nigro; pedibus chalybeo-nigris; alis ex basi aurantiacis, postice nigris, ciliis posteriorum a basi ad medium aurantiacis (♀). Magnitudine *Oec. cuspidellæ* minoris, sequentibus major. Caput violaceo-nigrum, fronte lata. Palpi thoracis longitudine, recurvi, graciles; articulo primo et secundo ochraceis, secundo squamis subincrassato, basim versus attenuato; terminali secundi longitudine, tenui, acuto, fusco. Haustelli dorsum ad basim squamis exalbidis tectum. Antennæ abdominis fere longitudine, latere exteriore dense pilosæ, pilis nigris, chalybeo-nitidis, paulatim magnitudine accrescentibus, ante antennarum ultimam octavam fere partem abrupte desinentibus; hæc pars terminalis nuda est, nigra, subserrata. Thorax lævigatus, niger, nitidulus. Patagia miniata, margine exteriore latius violaceo nigro. Pedes nigri, chalybeo-coerulei instar nitidi; anticorum coxæ et posticorum tibiæ ad basim miniatæ. Tibiæ tarsique pedum

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posteriorum crassi; tibiæ posticæ quater squamis setisque incrassatæ, nodis apicem versus majoribus; spinæ uno latere pilis ciliatæ, apice nudo, acuto; tarsi postici et ipsi in articulorum apicibus squamis nonnihil tumidi, primo tumore reliquis distinctiore. Abdomen crassum, postice attenuatum, saturate aurantiacum; segmenta duo terminalia sicut venter nigra, violaceo-nitida; segmentum anale subconicum, truncatum oviductum testaceum exserit. Alæ anteriores 3½''' longæ, ex basi angusta sensim dilatatæ, apice subobtusæ, aurantiacæ, majore parte postica nigræ, violaceo-nitidulæ. Color aurantiacus ad costam multo longius quam ad dorsum propagatur, nusquam a nigro certis finibus separatus. In humero macula parva nigra adest. Cilia nigricant. Alæ posteriores anguste lanceolatæ, dilutius aurantiacæ, circa apicem acutum nigricant. Cilia ex basi ad marginis postici medium alis concolora, deinde omnino fusco-nigra. Subtus iidem colores, nisi quod aurantiacus in anterioribus alis majus spatium occupat nec in basi macula nigra inquinatur.

"Habitat in terra Natalensi." (Exp. al. 16 mm.).

It is worthy of notice that a specimen collected by Woodford in the Solomon Islands, and now in the British Museum, is so like this species as to be easily taken for it by a superficial observer. It is, however, somewhat larger, but possesses the same colouring, except that the dark cilia of the hind wings extend more towards the base. The body is rather black than yellow; the structure of the legs, even to the conspicuous fringes on the spurs, is precisely the same as in *Œdematopoda princeps*; the hind wings are certainly somewhat wider towards the apex, but the following characters seem to me to suffice to remove it, for the present at least, from the neighbourhood of all the genera treated of in this paper. Instead of the long recurved palpi possessed by all of these, it has extremely short, inconspicuous, drooping labial palpi of entirely different structure; moreover, the apical vein of the fore wings is not forked.

[Pl. vi., fig. 7.]

clerodendronella, Stn., Trans. Ent. Soc. Lond. (n. s.), V., 125—6 (1859).

"Alis anticis cupreo-rufis; alis posticis dilutioribus, griseo-ciliatis. Exp. al. 6—6½ lin. (= 13—14 mm.).

"Head and face purple. Second joint of the palpi reddish

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orange; terminal joint purple. Antennæ purple-black, densely clothed along one side with long purple-black scales. Anterior wings brilliant coppery red, with the cilia greyish. Posterior wings reddish orange, with grey cilia. Thorax coppery red. Abdomen blue-black, with a slender whitish belt nearly in the middle. Legs black spotted with white; the hind legs with the spines replaced by thick tufts of black scales*; the tarsi also much thickened with black scales.

"Larva dirty brown; head dark reddish brown; second segment black. It feeds in the tops of *Clerodendron*, drawing together the leaves with a white web.

"The perfect insects made their appearance on the 27th July, 1856; the insect, when at rest, erects its beautifully plumed hind legs above its back, behind the head, and keeps constantly vibrating its incrassated antennæ.

"Collected near Calcutta by Mr. Atkinson."

[Pl. vi., fig. 8.]

ignipicta, Btl., Trans. Ent. Soc. Lond., 1881, 593—4.

[Capite thorace et antennis purpureis. Alis anticis rubidis, subpurpurascentibus, basi et margine costali peranguste purpureo, margine dorsali ante angulam analem latiore purpureo; ciliis fuscis. Alis posticis brunneis; ciliis griseo-fuscis. Abdomine et tibiis purpureis.—Wlsm.]

"Purplish black; primaries with a very broad carmine subcostal streak from near the base to the outer margin, where it meets a narrow stripe of the same colour, which runs round the margin half-way to the base; secondaries dark bronzy brown; head shining, smooth, plumbageous; thorax showing fiery cupreous points in certain lights; abdomen with extremely narrow orange posterior margins to the segments; under surface bronzy brown; primaries cupreous towards the base, purplish towards the apex, and with purple costal margin; pectus, as seen between the large coxæ, brilliant opaline; legs slightly opaline along the centre of the inferior margins; the long setose antennæ, and the spines and bristles upon the legs, black; expanse of wings, 8 lines (= 17 mm.)

"Tokei (*Fenton*).

"A very beautiful little species of this singular genus."

Since this paper was written Mr. H. Druce has kindly

* See *ante*, p. 5.

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given me a specimen of a species of Œ*dematopoda* almost undistinguishable from *ignipicta*. It differs in the more streaked appearance of the fore wings; the dorsal margin is not uniformly black, the base of the wing being also decidedly red, not black; two lines of black scales are visible above the fold, but the specimen is not in condition to be described as the type of a new species. It was collected by Mr. W. Doherty at Perak, thus extending our knowledge of the geographical distribution of this interesting genus.

[Pl. vi., fig. 9.]

leechi, n. s.

Capite rufo, fronte violaceo-fusco. Thorace antice rufo, postice violaceo-fusco. Antennis dense et late pilosis rufis, apice et basi violaceo-fuscis. Alis anticis rufis, angustissime violaceo-fusco marginatis; linea subdorsali ex basi per plicam violaceo-fusca; ciliis fuscis. Alis posticis cupreo-brunneis; ciliis dilute fuscis. Abdomine fusco-purpureo. Tibiis posticis violaceo-fuscis.

Antennæ red along the middle, but with the base and apex purplish fuscous, with an erect fringe of very long scales, corresponding in colour to the part from which it rises, the extreme apical joints only naked. *Palpi* slender, recurved, pale bronzy fuscous above, greyish fuscous beneath. *Haustellum* greyish fuscous. *Head* red above; face violaceous-fuscous. *Thorax* red, tending to violaceous-fuscous posteriorly. Under side shining greyish fuscous. *Fore wings* red, very narrowly margined with purplish fuscous by a slender line along the extreme costal and dorsal margins, but not reaching to the apex; a streak of similar colour extends from the base across the fold, vanishing above the anal angle; cilia fuscous. Under side violaceous. *Hind wings* brownish cupreous, with fuscous cilia, the extreme base at the abdominal angle transparent. Under side shining pale fuscous. *Abdomen* deep purple, with a narrow paler spot at the base. Under side purple. *Legs* tinged with purple, with long spurs, and also fringed with purplish scales, having tufts of purplish scales above at the joints, *Exp. al.* 15 mm.

Hab. Satsuma, Japan, May, 1886 (*Mr. J. H. Leech*).

Type, ♂, Mus. Wlsm.

This species differs from *ignipicta*, Btl., to which it is nearly allied, in the beautiful red-fringed antennæ, and in the red head and thorax, which in that species are

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purplish, and also in the brighter red of the anterior wings.

ERETMOCERA, *Z.* = STAINTONIA, *Stgr.* = EXODOMORPHA, *Wlk.* = CASTORURA, *Meyr.*

Eretmocera (B) *Eretmocera*, Z., Handl. Kong. Svensk. Ak., 1852, 96.

(ἐρετμός, remus; κέρας, antenna).

Type, ♂ ♀. *Eretmocera fuscipennis*, Z.

"*Eretmocera.*

"*Char. essent.*—Caput læve. Antennæ uno latere squamis piliformibus alatæ, apice nudo. Alæ elongatæ.

"*Char. nat.*—Antennæ uno latere dense squamato-pilosæ, pilis sensim longitudine acutis, apice nudo. Capilli appressi, fronte rotundata. Palpi labiales mediocres, recurvi, articulo terminali longiore, tenui, acuto. Haustellum mediocre spirale. Alæ elongatæ ciliis longis, posteriorum angulo anali subnullo. Abdomen breviusculum, crassum, planiusculum. Pedes robusti, tibiarum spinæ longiusculæ.

"(B) *Eretmocera.*—Antennæ paulo ultra medium usque pilosæ, pilis brevioribus. Pedes squamis non nodosi. Abdomen utrinque squamis marginatum.

"Genus hoc *Oecophoræ* eam partem, quæ *esperellam*, *seleniellam*, *chenopodiellam*, etc. continet, cum *Elachistis æratella*, *modestella*, etc. conjungere videtur. Distinguitur ab utrisque antennis non simplicibus, sed a basi ultra medium in latere exteriore pilosis, palpis longioribus, abdomine latiore."

= STAINTONIA, *Stgr.*, Stett. Ent. Zeit., XX., 250 (1859).

Type, ♂ ♀. *Staintonia medinella*, Stgr.

"Caput obtusum, squamis appressis. Ocelli nulli.* Antennae crassae, in ♂ pubescenti-ciliatae. Palpi labiales adscendentes, recurvi, acuminati. Haustellum longum, basi squamatum. Alae anteriores elongatae; posteriores angustissime lanceolatae, cellula media aperta, costa media interiore tripartita, costa media exteriore tripartita. Abdomen depressum, squamis lateralibus erectis.

"Dem genus *Butalis* am nächsten; besonders durch den von oben nach unten sehr stark zusammengedrückten Leib, dessen Ränder durch grosse seitlich abstehende Schuppen gezähnt erscheinen, verschieden. Die Fühler sind bedeutend dicker als

* This is an error. I find ocelli present in my specimens received from Dr. Staudinger.

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bei allen mir bekannten Butalis-Arten. Der Rippenverlauf ist gleichfalls verschieden, namentlich auf den Hinterflügeln, wo die Mittelzelle ganz offen ist. Die innere Mittelrandsrippe theilt sich in drei, die äussere in zwei Aeste. Genaueres werde Ich später geben."

♂ ♀ = Exodomorpha, *Wlk.*, Cat. Lp. Ins. B. M., XXIX., 833 (1864).

Type. *Exodomorpha divisella*, Wlk.

"♂ ♀. Corpus robustum. Proboscis brevis. Palpi læves, arcuati, ascendentes, capitis latitudine longiores. Antennæ subincrassatæ, apices versus subfimbriatæ. Abdomen ales posticas longissime superans. Pedes læves, validi; tibiæ posticæ calcaribus longis approximatis. Alæ anticæ perangustæ, apice rotundatæ; posticæ longissime fimbriatæ.

"Body stout. Proboscis short. Palpi smooth, curved, rising a little higher than the vertex, longer than the breadth of the head; third joint setiform, shorter than the second. Antennæ shorter than the fore wings, slightly incrassated, except towards the tips, slightly fringed at the end of the incrassated part. Abdomen extending for three-fourths of its length beyond the hind wings. Legs stout, smooth; hind tibiæ with four long approximate spurs. Wings very narrow. Fore wings rounded at the tips; costa straight; exterior border extremely oblique. Hind wings with a very long fringe."

= Castorura, *Meyr.*, Proc. Linn. Soc. N. S. W. (2nd ser.), i., 1047 (1887).

Type, ♀. *Castorura chrysias*. Meyr.

"Head smooth; ocelli present; tongue well-developed. Antennæ almost as long as the fore wings, basal half thickened with scales, becoming long and roughly projecting on back towards middle, basal joint elongate, rather dilated terminally, without pecten. Labial palpi moderate, curved, ascending, slender, loosely rough-scaled beneath throughout, terminal joint almost as long as second, acute. Maxillary palpi obsolete.* Abdomen (in ♀) very broad, flattened; apical segment with lateral tufts of scales. Posterior tibiæ smooth-scaled, spurs long, tarsi somewhat rough beneath. Fore wings elongate-lanceolate; vein 1 simple, 2 from ¾ of cell, 6 and 7 stalked, 7 to costa, 8 absent, 9 from near 7, 11

* The maxillary palpi are so minute as to be easily overlooked, but they are visible under a microscope.

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from ¾. Hind wings ⅔, elongate-lanceolate, cilia 2; costa towards base with a fringe of rough scales drawn over wing; veins 2, 3, 4, 5 equidistant and parallel, 6 and 7 approximated at base."

Tabulation of the species comprised in the genus *Eretmocera*:—

A. Fore wings unicolorous.
  a. Hind wings yellow = *derogatella*, Wlk.
  b. Hind wings red.
    1. Fore wings brown = *fuscipennis*, Z.
    2. Fore wings purple = *carteri*, Wlsm.
B. Fore wings 3-spotted = *lætissima*, Z.
C. Fore wings with two spots and a streak.
  a. Streak straight, medio-basal.
    1. Streak clear and distinct, no black spot on anal segment = *basistrigata*, Wlsm.
    2. Streak indistinct, sometimes obsolete, a black band across anal segment = *scatospila*, Z.
  b. Streak taking the form of a dorsal lunule.
    1. Hind wings red = *miniata*, Wlsm.
    2. Hind wings yellowish.
      a. With a dark bar across anal segment = *dorsistrigata*, Wlsm.
      β. With dark lateral disconnected fascicules on anal segments = *lunifera*, Z.
D. Fore wings 4-spotted.
  a. Spots distinct.
    1. Hind wings brown = *impactella*, Wlk.
    2. Hind wings yellow = *chrysias*, Meyr.
  b. Spots indistinct, the basal pair blended = *medinella*, Stgr.

[Pl. vi., fig. 10.]

fuscipennis, Z.,* Handl. Kong. Svensk. Ak., 1852, 97—9.

"Alis anterioribus brunneis; posterioribus supra fuscescentibus, subtus puniceis, ciliis circa apicem fuscis, ceteris puniceis; abdomine coccineo, macula baseos dorsali segmentoque anali fuscis (♂ ♀).

"Var. *b*, ut *a*, sed colore flavissimo pro puniceo coccineoque ♂.

"Quæ hic sub *Eretmocera* enumero quatuor nomina, utrum ad species diversas vere pertineant an varietates solum unius speciei denotent, persuasum mihi non est. Insectis his eadem omnibus structura, nec differunt fere nisi pictura. Quum vero *E. lætissimæ* specimina quatuor inter se simillime maculata, saltem in alis, comparem, consultius esse opinatus sum, in picturæ differentia

* *fuscipennis*, Z., is now restricted to the red form (var. *a*); the yellow form (var. *b*) = *derogatella*, Wlk.

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differentiam specierum agnoscere et tempori futuro relinquere ut me aut confutet aut comprobet.

"Differt *E. fuscipennis* a sequentibus alis anterioribus omnino immaculatis. Caput et thorax brunnea; occiput squamis nonnullis flavis ciliatum est. Palpi recurvi, thoracis longitudine, satis graciles, ad basim et in dorso late albidi, subtus fuscescentes; articulus terminalis præcedenti longitudini subæqualis, multo tenuior, acutissimus. Haustellum in basi crassum ibique ad latera albo squamatum ceterum brunnescit et ad anum fere extendi potest. Antennæ abdominis longitudine, fuscæ, a basi ultra medium in latere exteriore squamis approximatis incrassatum, quæ apicem versus longiores fiunt ac violaceo colore nitent; nuda pars apicalis filiformis, pube tenera ciliata. Feminæ antennæ magis luteo-brunneæ squamisque rarioribus tenuiores; sed eas ut totum animal nonnihil detritas esse adspectus docet; ceterum earum structura eadem quam in mare. Pectus pallide flavum. Pedes brunnei, femora subtus exalbida, tibiæ violaceo-nitidæ; posticæ in dorso ante medium fasciculum pilosum modicum gerunt. Abdomen planum, utrimque squamarum elongatarum ac piliformium fasciculis marginatum, coccineum (in varietate *b* flavissimum) una cum squamis; ad basim macula transversa fusca; segmentum anale nigrum, squamis nonnullis ex ano eminentibus puniceis; valvularum analium margo ochraceus; venter pallide flavus, squamulis fuscescentibus adspersus, macula utrimque ad lateris medium fuscescens irregularis.

"Alæ anteriores ♂ 8‴, ♀ 2⅔‴ longæ, brunneæ, subnitidulæ, cilia fusca. Subtus violaceo nitent; sub costa reflexa linea ex basi attenuata flava ad mediam alæ longitudinem procurrit, lineaque in disco obsoleta supra angulum dorsalem in varietate *a* conspicitur, quæ varietas *b* caret.

"Alæ posteriores anguste lanceolatæ, valde acutæ, dilute brunneæ, basim versus dilutiores ibique squamis pallide puniceis (in var. *b* flavidis) immixtis. Subtus puniciæ (var. *b* flavæ), apice ipso fusco. Cilia utriusque paginæ in var. *a* punicea, in var. *b* flava, in utraque varietate circa apicem latius fusca.

"Habitat in tractibus fluviorum Limpopônis et Gariepis." (Exp. al. 16 mm.).

= ♂ ♀, *Exodomorpha inclusella*, Wlk., Cat. Lp. Ins. B. M., XXIX., 834 (1864).

"♂ ♀. Purpureo-cuprea; caput subtus pectorisque latera aurato-flava; abdomen aurato-rufum, basi apice ventreque auratis, macula basali fasciaque subapicali purpureo-cupreis; alæ posticæ auratæ, costa fimbriaque rufis.

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"Dark purplish cupreous. Head beneath and sides of the thorax pale gilded yellow. Abdomen gilded red, with a purplish cupreous spot near the base, which is gilded; a purplish cupreous subapical band; tip and under side gilded. Hind wings gilded; costa and fringe red, the latter blackish cupreous towards the tip. Length of the body, 2¾ lines; of the wings, 5½ lines (= 12 mm.).

"*E. divisella*, var.?

"a. Port Natal. From M. Gueinzius' collection. b. South Africa. From Mr. Argent's collection."

Type, ♂ ♀, B. M.

[Pl. vi., fig. 11.]

carteri, n. s.

Alæ anticæ unicolores, subnitidæ, viride-purpuriæ, ciliis fuscis. Alæ posticæ cupreæ, ciliis ante medium coccineis, post medium fuscis. Abdomine coccineo, macula basali purpureo, apicali nigro. Capite, antennis, thorace, et tibiis purpureo-fuscis.

Antennæ purplish fuscous. *Palpi* purplish fuscous, yellowish at the base externally. *Head* purplish fuscous. *Thorax* greenish, or purplish fuscous above, bright ochreous beneath. *Fore wings* glossy green, or purplish; cilia fuscous. Under side brownish fuscous, tinged with purplish, a slight ochreous streak from the base reaching nearly half-way along the costal margin. *Hind wings* coppery brown; cilia before the middle carmine, beyond it dark fuscous. Under side carmine; cilia fuscous, except at the base of the abdominal margin. *Abdomen* brilliant carmine, tinged with ochreous about the basal portion, a patch at the base rich purple, and the anal segments black fringed with carmine. Under side ochreous. *Legs* dark purplish fuscous. *Exp. al.* 12 mm.

Hab. Bathurst (*Mr. G. T. Carter*).

Type, ♂, Mus. Wlsm.

One of my three specimens from Bathurst, collected by Mr. G. T. Carter, has the anal segments entirely carmine, without any black whatever.

[Pl. vi., fig. 12.]

derogatella, Wlk., Cat. Lp. Ins. B. M., XXIX., 834 (1864).*

"♂. Cuprea; caput subtus pectorisque latera aurato-flava; abdomen aurato-flavum, apice nigrum; alæ posticæ auratæ.

* = *fuscipennis*, Z., var. *b.* (*ante*, pp. 26—7).

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"Cupreous. Head beneath and sides of the pectus gilded yellow. Abdomen gilded yellow; tip partly black. Hind wings gilded tip and exterior part of the fringe gilded. Length of the body, 2¾ lines; of the wings, 5½ lines (= 12 mm.).

"a. Port Natal. From M. Gueinzius' collection."

Type, ♂, B. M.

[Pl. vi., fig. 13.]

dorsistrigata, n. s.

Capite brunneo. Palpis subflavidis. Antennis violaceo-fuscis. Thorace brunneo. Alis anticis brunneis, subænescentibus, lunula dorsali ante medium, maculisque duabus post medium oppositis, flavidis; ciliis fuscis. Alis posticis dilute brunneis, ænescentibus, in basi subflavidis; ciliis aurantiacis apud apicem fuscis. Abdomine aurantiaco, in basi flavo, macula prope basim purpureo, vittaque anali purpureo apicem non attingente. Tibiis purpureo fuscis.

Antennæ purplish fuscous. *Palpi* pale yellowish above, brownish fuscous beneath, except on the basal one-third. *Head* bronzy brown, a few pale yellow scales separating it from the thorax at the sides. *Thorax* bronzy brown. *Fore wings* bronzy brown, with a pale, oblique, dorsal patch at the basal third, reaching nearly to the middle of the wing, and two opposite on the outer third about equal in size, the first on the costa, the second at the anal angle, all pale lemon-yellow; cilia fuscous. Under side bronzy brown, the extreme costal margin very pale ochreous, a line of orange scales extending from the middle of the base to the anal angle. *Hind wings* golden brown, tending to pale yellowish on the upper part of the costal half, costal cilia pale yellow to beyond the middle; orange-yellow on the dorsal margin for the same distance, thence fuscous around the apex. Under side orange-yellow, thickly sprinkled with vermilion scales; cilia orange-yellow to beyond the base, thence fuscous. *Abdomen* bright yellow at the base, near which is a deep purple bar, not reaching to the sides; below this bar the abdomen is orange, with a wide purplish fuscous band crossing the anal segment, which leaves the anal tuft pale ochreous. Under side whitish. *Legs* purplish fuscous, femora whitish, some wide pale ochreous bands across the tibiæ and tarsi beneath. *Exp. al.* 15 mm.

Hab. Zanzibar (*Mr. F. J. Jackson*).

Type, ♂, Mus. Wlsm.

This species is apparently allied to *lunifera*, Z., figured Trans. Ent. Soc. Lond., 1881, Pl. XIII., 41. It differs

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in the bronzy-brown colour of the anterior wings, in the larger oblique yellowish patch on the dorsal margin, further removed from the base, in the yellow base of the abdomen, followed by a dark band, and in the complete dark bar crossing the anal segments; whereas in *lunifera* the lateral fascicules of scales only are dark.

[Pl. vi., fig. 14.]

lunifera, Z., Handl. Kong. Svensk. Ak., 1852, 100.

"Alis anterioribus fuscis, lunula dorsali ante medium punctisque duobus posticis oppositis flavis; posterioribus subtus cum ciliis interioribus flavis; abdomine flavo, ani subtus macula fusca (♀?).

"Speciminis tantum alæ anteriores probe conservatæ sunt. Hæ lunulam dorsalem punctaque duo opposita habent, quibus et a *scatospila* et a *lætissima* distinguuntur.

"Caput et thorax fusca, occipitis, margo flavo-squamatus. Antennæ fuscæ (fractæ), eadem ut in *scatospila* structura esse videntur. Palpi in basi et in dorso flavidi, subtus fuscescentes. Pectus ochraceum. Pedes fusci, femoribus subtus flavidis, tibiis posticis violaceo-nitidis, fusco-spinosis. Abdomen flavum in basi fuscum; fasciculi laterales (plerique desunt) segmentorum postremorum flavi, fasciculus segmenti analis niger apicem ani non attingit; venter pallidior quam dorsum dimidio basali segmentoque anali, exceptis fasciculis lateralibus, nigris.

"Alæ anteriores 2⅔''' longæ, fuscæ, signis subcitrinis. Lunula tenuis dorsalis longe ante alæ medium, valde inclinata, dimidiam alæ latitudinem superat. Postice puncta duo perpendiculariter opposita, majus angulo dorsali insidens, minus margini costali.

"Alæ posteriores brunneæ, basim versus dilutiores flavoque mixtæ; cilia flava, circa apicem late fusca.

"Subtus alæ ant. fuscæ, linea flava sub costa replicata brevi. Lunulæ flavæ apex in lineam plicæ transit, quæ supra angulum dorsalem marginem posticum tangit ibique incrassata est. Posteriores flavæ apice breviter fuso; cilia ut supra.

"Habitat ubi præcedens" (in tractibus fluviorum Limpoponis et Gariepis). (Exp. al. 12 mm.).

[Pl. vi., fig. 15.]

miniata, n. s.

Capite violaceo-fusco. Thorace violaceo-fusco, postice flavide bimaculata. Alis anticis purpureo-fuscis, lunula dorsali ante medium, maculisque duabus post medium oppositis flavidis; ciliis fuscis. Alis posticis æneo-purpureis; ciliis miniatis, circa apicem

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fuscis. Abdomine miniato, in basi flavo, macula lunulari prope basim purpurea, fasciculis duobus lateralibus segmenti analis nigris. Tibiis violaceo-fuscis.

Antennæ bronzy brown, fringed with purplish scales to beyond the middle. *Palpi* fuscous, whitish at the base. *Haustellum* whitish at the base. *Head* bronzy fuscous, a few yellow scales at the back. *Thorax* bronzy fuscous, with two pale yellow spots at its posterior margin. *Fore wings* purplish fuscous, with three pale yellow spots, the first obliquely curved, extending across the fold from near the base of the dorsal margin to the upper half of the wing; the second and third about the commencement of the apical third of the wing, one costal, the other dorsal and slightly nearer the base, both of equal size; cilia dark fuscous. Under side tinged with golden yellow at the base, bronzy fuscous beyond, with a vermilion streak running along the middle from the base to the anal angle. *Hind wings* bronzy, tinged with golden red at the base; cilia at the basal two-thirds of the costal and dorsal margins carmine, beyond dark fuscous. Under side vermilion; cilia carmine, dark fuscous around the apex. *Abdomen* vermilion, with a yellow band at the base, wider in the middle than at the sides, followed by a dark purple crescent-shaped spot, the anal segments with a tuft of black scales on each side. Under side pale ochreous, with two square-edged lateral patches near the base and a wide bar across the anal segments, purplish fuscous. *Legs* bronzy fuscous above, spurs and under sides pale ochreous. *Exp. al.* 14 mm.

Hab. Zanzibar (*Mr. F. J. Jackson*); Port Natal (*Gueinzius, B. M.*).*

Type, ♂ ♀, Mus. Wlsm.

[Pl. vi., fig. 16.]

Eretmocera scatospila, Z., Handl. Kong. Svensk. Ak., 1852, 99—100.

"Alis anterioribus brunneis, linea ex basi, maculis duabus posticis oblique suboppositis lituraque apicis obsoletis lutescenti-griseis; posterioribus subtus cum ciliis interioribus coccineis; abdomine coccineo, macula baseos dorsali segmentoque anali nigris (♀?).

"Minor quam ♂ præcedentis (*fuscipennis*). Differt ab ea specie alis anterioribus maculatis, a sequentibus (*lunifera* and *lætissima*) maculis obsoletis segmentique analis apice coccineo.

* This species was confused with *divisella* by Walker (see p. 33).

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"Caput et thorax brunnea, occipitis squamæ marginales nonnullæ flavidæ. Antennæ ut in *E. fuscipenni*, sed squamis longioribus incrassatæ, fusco-nigræ. Palporum basis et dimidium basale articuli secundi sordide exalbida, reliqua pars in dorso albida, subtus fuscescens. Pectus flavescit. Pedes luteo-brunnei; spinæ anteriorum pars a luce aversa et tarsorum posticorum articuli subtus colore sunt exalbido; tibiarum posticarum dorsum ex basi ad medium usque flavidum. Abdomen in dorso coccineum; in basi macula nigra, coeruleo-nitida, posterius coarctata segmenta duo occupat. Segmentum anale nigrum, macula apicali vitellina; venter pallide ochraceus, vitta utrimque postice acuminata nigricanti; segmentum anale vitellinum, utrimque late nigrum.

"Alæ anteriores 2¾''' longæ, luteo-brunneæ, opacæ, maculas lutescenti-griseas squamis elongatis compositas gerunt. Linea indeterminata hujus coloris e media basi procedens ante mediam alam evanescit. Maculæ duæ posticæ ita oppositæ sunt, ut altera angulum dorsalem impleat, altera costalis apici alæ propior sit. Apex ipse maculam parvam, parum distinctum habet. Præterea squamæ griseæ nonnullæ hic illic sparsæ.

"Alæ posteriores brunnescentes, apice fusco. Cilia ex basi ad medium usque coccinea, deinde fusca.

"Subtus alæ ant. fuscæ. Linea flava sub costa reflexa ex basi ad apicem alæ fere excurrit. Linea altera aurantiaca plicam sequens pone mediam alam incrassata cum dorsi colore flavido cohæret. Posteriores puniceæ, apice solo cum ciliis circumdantibus nigræ.

"Habitat in tractibus fluviorum Limpoponis et Gariepis." (Exp. al. 14 mm.).

[Pl. v.]

Eretmocera basistrigata, n. s.

Alæ anticæ purpureo-fuscæ, striga basali et maculis duabus marginalibus oblique oppositis ochreo-flavis; ciliis fuscis. Alæ posticæ puniciæ, apice et ciliis apicalibus fuscis. Abdomine puniceo. Antennis et tibiis purpureo-fuscis. Palpis ochraceis. Thorace ochreo bistrigato.

Antennæ purple. *Palpi* ochreous, with a fuscous line along the under side of the apical joint, and at the apex of the 2nd joint. *Head* shining bronzy fuscous. *Thorax* shining bronzy fuscous, marked with two lateral bright ochreous streaks, and fringed posteriorly with the same colour, blending with the crimson of the abdomen. Under side shining yellow ochre. *Fore wings* purplish fuscous, with a conspicuous basal streak extending nearly half-way along the middle of the wing, followed by two spots, the larger of

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which at the anal angle precedes the smaller on the costal margin; these markings are bright yellow ochre; cilia smoky fuscous. Under side crimson, tinged with fuscous. *Hind wings* crimson, tipped with fuscous; cilia smoky fuscous around the apex, bright carmine along the basal two-thirds of the abdominal margin. Under side similar to the upper. *Abdomen* crimson, the centre of the anal segment sometimes tinged with fuscous, its lateral fringes ochreous. Under side shining yellow ochre, tinged with purple at the base. *Legs* purplish fuscous. *Exp. al.* 18 mm.

Hab. Bathurst, West Africa (*Mr. G. T. Carter*).

Type. ♂, Mus. Wlsm.

[Pl. vi., fig. 17.]

lætissima, Z., Handl., Kong. Svensk. Ak., 1852, 100—1.

"Alis anterioribus brunneis, macula subdorsali ante medium majore duabusque posticis oblique oppositis flavissimis; posterioribus puniceis apice fusco (♂).

"Maculæ alarum anteriorum flavissimæ et majores hanc a præcedentibus distinguunt. Caput et thorax brunnea. Margo occipitis posticus, patagiorum margo interior et apex, maculaque eorum apici contigua flava. Antennæ ut in *scatospila*, squamis violaceo-nitidis. Palpi ut in prioribus. Pectus læte flavo-maculatum. Pedes fusci, ad femorum basim pallide flavi; posticorum femora in uno latere, tibiæ in basi et sub primo spinarum pari pallide flavæ; spinæ earum albidæ. Abdomen supra puniceum, ad basim macula indistincta fusca. Venter flavus. Segmenti analis fasciculis superne puniceus, subtus flavus, interne ater, quo colore pili laterales in uno specimini late tincti sunt.

"Alæ anteriores 2½—2¾''' longæ, obscure brunneæ, sub apicem violaceo-nitidulæ, maculis flavissimis ornatæ. Macula prima oblonge ovata non longe a basi plicam ita occupat, ut major ejus pars dorso alæ quam costæ adjaceat. Maculæ duæ reliquæ minores oblique oppositæ, altera in angulo dorsali, altera in costa apici vicinior.

"Alæ posteriores puniciæ, apice fusco. Cilia punicea, circa apicem late fusca.

"Subtus alæ puniciæ; anteriorum costa cum apice ciliisque omnibus nigra, linea sub costa replicata brevis flava; posteriorum color ut supra.

"Habitat in tractibus fluviorum Limpoponis et Gariepis." (Exp. al. 14 mm.).

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= ♂ ♀, *Exodomorpha divisella*, Wlk., Cat. Lp. Ins. B. M., XXIX., 833—4 (1864).

"♂ ♀. Obscure purpureo-cuprea; caput subtus pectorisque latera aurato-flava; abdomen coccineum, basi ventreque aurato-flavis, maculis tribus purpureo-cupreis, fasciis duabus ventralibus purpureis; alæ anticæ guttis tribus flavis; posticæ auratæ, costa fimbriaque rufis.

"Dark purplish cupreous. Head beneath and pectus on each side pale gilded yellow. Abdomen scarlet, with a purplish cupreous spot near the base, which is gilded yellow; a purplish cupreous spot on each side at the tip; under side gilded yellow, with two purplish bands; first band near the base widely interrupted; second subapical entire. Fore wings with three pale yellow dots; first dot discal, near the base; second costal, opposite the third, which is near the end of the interior border. Hind wings gilded; costa and fringe red, the latter blackish cupreous towards the tip of the wing. Length of the body, 2¾ lines; of the wings, 5½ lines (= 12 mm.).

*"a, b. Port Natal. From M. Gueinzius' collection. c—e. Sierra Leone. From Mr. Foxcroft's collection."

Type, ♂ ♀, B. M.

[Pl. vi., fig. 18.]

impactella, Wlk., Cat. Lp. Ins. B. M., XXIX., 637—8 (1864). (*Gelechia*, Wlk.).

"Obscure cuprea, subtus albida; abdomen luteum, basi apiceque cupreum; alæ anticæ angustæ, acutæ, lituris duabus posticis, una discali unaque exteriore albidis.

"Dark cupreous, slender, whitish beneath. Palpi slender, much longer than the breadth of the head; third joint setiform, a little shorter than the second. Antennæ smooth, rather stout. Abdomen luteous, dark cupreous towards the base and towards the tip. Wings narrow, acute; fringe long. Fore wings with a whitish streak along the base of the interior border, and with three whitish elongated spots; first spot in the disk before the middle; second on the interior border beyond the middle; third costal nearer the tip; exterior border very oblique. Length of the body, 3½ lines; of the wings, 9† lines (15 mm.).

"a. b. North Hindostan. From Mr. James' collection.

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* These two specimens are *miniata*, Wlsm., the description of *divisella* being evidently taken from the Sierra Leone specimens.

† This is apparently an error for 7'''.

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"This species appears to have some affinity to the *Ægeriidæ*."

Type, ♂, B. M.

A single specimen in the British Museum from North India, not in sufficiently good condition for description, is closely allied to *impactella*. It has a very faint indication of two dorsal yellowish spots on its unicolorous brownish fore wings. The purple band on the yellow abdomen is wider than in *impactella*, and stretches farther downwards.

[Pl. vi., fig. 19.]

chrysias, Meyr., Proc. Linn. Soc. N. S. W. (2nd ser.), I., 1047—8 (1887).

[Capite et thorace ænescenti-fuscis. Antennis purpureo-fuscis. Alis anticis purpureis, maculis quatuor flavis, duabus dorsalibus, tertiæ subcostali, quarta costali ante apicem; ciliis fuscis. Alis posticis ænescenti-flavidis; ciliis flavidis, partem griseo-fuscis. Abdomine aurantiaco, fascia prope basim purpurea, segmento anali purpureo-fusco.—Wlsm.]

"♀, 15 mm. Head, palpi, antennæ, thorax, and legs dark purplish fuscous; palpi yellow-whitish towards base; thorax with posterior extremity orange. Abdomen orange-yellow, anal segment purple-blackish, except apex. Fore wings purple-black, with four roundish yellow spots; first on inner margin towards base; second largest, in disc before middle; third on inner margin before anal angle; fourth on costa beyond third; cilia purple-black. Hind wings yellow, apical fourth dark purple-fuscous; cilia dark grey, towards anal angle yellowish.

"Maryborough, Queensland; one specimen (coll. *Macleay*)."

[Pl. vi., fig. 20.]

medinella, Stgr., Stett. Ent. Zeit., XX., 250—1 (1859).

"Alis anterioribus aeneo-fuscis, fasciis duabus albidis; alis posterioribus fuscis; abdomine plus minusve lateritio, ano caeruleo-nigro, ♂ ♀, 10—12 mm.

"Vorderflügel erzschillernd braun mit weisslichen Schuppen mehr oder weniger gemischt, und mit zwei weisslichen, nicht scharf begrenzten Querbinden, die eine bei ⅓, die andere vor dem Aussenrande. Letztere macht in der Mitte eine bedeutende Biegung. Hinterflügel dunkel. Der Leib roth, namentlich bei

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den Weibchen. Der After bleibt stets und die ersten Segmente meistens nach oben blauschwarz.

"Kalisch entdeckte diese Art in Juni bei Chiclana auf den Blüten von Umbelliferen sitzend."

INDEX.

TINÆGERIA, *Wlk.*

Cat. Lp. Ins. B. M. VIII. 260 (1856); Wlsm. ante 10—11 (1889).

Type *Tinægeria ochracea* Wlk.

[= ARAUZONA Wlk. Cat. Lp. Ins. B. M. XXXI. 25—6 (1864); Wlsm. ante 8—9, 11 (1889). Type *Arauzona basalis* Wlk.]

♂ ♀ **ochracea** Wlk. Cat. Lp. Ins. B. M. VIII. 260 (1856); Wlsm. ante 11—13, Pl. i. (1889).

= *Eretmocera ? æneiceps* F. & R. Reise Novara, pl. cxxxviii. 62 (1875); Wlsm. ante 9, 12 (1889).

(*Type* ♀ *? Vienna*).

Imago, October.

Hab. S. AMERICA—Para, Bogota, Santarem.

(*Type* ♂ ♀ *B. M.*)

♂ **fasciata** Wlk. Cat. Lp. Ins. B. M. VIII. 261 (1856); Wlsm. ante 13, Pl. vi. 1 (1889).

Hab. S. AMERICA—Para.

(*Type* ♂ *B. M.*)

♀ **basalis** Wlk.

Arauzona basalis, Wlk. Cat. Lp. Ins. B. M. XXXI. 26 (1864); Wlsm. ante 8—9 (1889).

Tinægeria basalis, Wlsm. ante 13, Pl. vi. 2 (1889).

Hab. S. AMERICA—Ega.

(*Type* ♀ *B. M.*)

SNELLENIA, *Wlsm.*, g. n.

ante 13—15 (1889). Type *Snellenia coccinea*, Wlsm.

♂ **coccinea** Wlsm sp. n. ante 15, Pl. ii. (1889).

Imago, July.

Hab. INDIA—Sikkim.

(*Type* ♂ *Mus. Wlsm.*)

♀ **tarsella** Wlsm. sp. n. ante 15—16, Pl. vi. 3 (1889).

Hab. INDIA—Darjeeling.

(*Type* ♀ *B. M.*)

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♂ ♀ **lineata** Wlk.

Tinægeria lineata Wlk. Cat Lp. Ins. B. M. VIII. 261 (1856); Wlsm. ante 8, 9—10 (1889).
Snellenia lineata Wlsm. ante 16, Pl. vi. 4 (1889).
= *Eretmocera ? sesioides* F. & R. Reise Novara, pl. cxl. 22 (1875); Wlsm. ante 9—10 (1889).
(*Type* ♀ *? Vienna*).
Imago, February.
Hab. Australia—Sydney.*
(*Type* ♂ ♀ *B. M.*)

♂ **flavipennis.**

Eretmocera ? flavipennis F. & R. Reise Novara, pl. cxxxviii. 59 (1875); Wlsm. ante 9—10 (1889).
Snellenia flavipennis Wlsm. ante 16 (1889).
Hab. (S. America ?).
(*Type* ♂ *? Vienna*).

♂ ♀ **latipes** Wlk.

Tinægeria latipes Wlk. Cat. Lp. Ins. B. M. XXXI. 25 (1864); Wlsm. ante 8 (1889).
Snellenia latipes, Wlsm. ante 16—17, Pl. vi. 5 (1889).
Hab. S. America—Para, Maranon.
(*Type* ♂ *B. M.*)

♀ **bimaculata** Wlsm. sp. n. ante 17, Pl. vi. 6 (1889).

Hab. Borneo—Sandakan.
(*Type* ♀ *Mus. Wlsm.*)

PSEUDÆGERIA *Wlsm.* g. n.

ante 17—18 (1889). Type, *Ochsenheimeria ? squamicornis* F. & R.

♀ **squamicornis** F. & R.

Ochsenheimeria ? squamicornis F. & R. Reise Novara, pl. cxxxix. 6 (1875); Wlsm. ante 18 (1889).
Pseudægeria squamicornis, Wlsm. ante 18—19, Pl. iii. (1889).
Hab. Fiji, Australia.
(*Type* ♀ *? Vienna*).

ŒDEMATOPODA *Z.*

Handl. Kong. Svensk. Ak., 1852, 96; Wlsm, ante 19—20 (1889).

Type *Œdematopoda princeps* Z.

[= Atkinsonia Stn. Trans. Ent. Soc. (n. s.) V. 125 (1859); Wlsm. ante 9, 20 (1889). Type *Atkinsonia clerodendronella* Stn.]

♂ ♀ **princeps** Z. Handl. Kong. Svensk. Ak. 1852, 96—7; Wlk. Cat. Lp. Ins. B. M. xxix. 707 (1864); Wlsm. Trans. Ent. Soc. 1881, 271: ante 20—1, Pl. iv. (1889).

Hab. Africa—Natal.
(*Type* ♀ *Stockholm Mus.*)

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* Walker's locality "Para" is an error; the types are from Sydney, purchased from Argent.

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♂ **clerodendronella** Stn.

Atkinsonia clerodendronella Stn. Trans. Ent. Soc. (n. s.) V. 125—6 (1859); Wlk. Cat. Lp. Ins. B. M. XXX. 900 (1864); Moore P. Z. S. 1867, 672; Wlsm. ante 9 (1889).

Œdematopoda clerodendronella Wlsm. ante 21—2, Pl. vi. 7 (1889).

Larva. On tops of *Clerodendron*, drawing together the leaves with a web.

Imago, July.

Hab. India—Calcutta.

(*Type, Mus. Stn.*)

♂ ♀ **ignipicta** Btl.

Eretmocera ignipicta Btl. Trans. Ent. Soc. 1881, 593—4; Wlsm. ante 9 (1889).

Œdematopoda ignipicta Wlsm. ante 22, Pl. vi. 8 (1889).

Hab. Japan—Tokei, Yesso.

(*Type, B. M.*)

♂ **leechi** Wlsm., sp. n., ante 23—4, Pl. vi. 9 (1889).

Imago, May,

Hab. Japan—Satsuma.

(*Type* ♂ *Mus. Wlsm.*)

ERETMOCERA *Z.*

Handl. Kong. Svensk. Ak. 1852, 96; Wlsm. ante 24, 26 (1889).

Type *Eretmocera fuscipennis*, Z.

[= Staintonia Stgr. Stett. Ent. Zeit. XX. 250 (1859); Wlsm. Trans. Ent. Soc. 1881, 271: ante 9, 24—5 (1889). Type, *Staintonia medinella* Stgr.]

[= Exodomorpha Wlk. Cat. Lep. Ins. B. M. XXIX. 833 (1864); Wlsm. Trans. Ent. Soc. 1881, 271: ante 9, 25 (1889). Type, *Exodomorpha divisella* Wlk.]

[= Castorura Meyr. Proc. Linn. Soc. N. S. W. (2nd s.) i. 1047 (1887); Wlsm. ante 9, 25—6 (1889). Type, *Castorura chrysias* Meyr.]

♂ ♀ **fuscipennis** Z.

Eretmocera fuscipennis (var. *a*) Z. Handl. Kong. Svensk. Ak. 1852, 97—8; Wlk. Cat. Lp. Ins. B. M. XXIX. 707 (1864); Wlsm. Trans. Ent. Soc. 1881, 271—2; ante 26—7, Pl. vi. 10 (1889).

= *Eretmocera inclusella*, Wlk. Cat. Lp. Ins. B. M. XXIX. 833—4 (1864); Wlsm. Trans. Ent. Soc. 1881, 271—2; ante 27—28 (1889).

(*Type* ♂ ♀ *B. M.*)

Hab. Africa—Limpopo-Gariep District, Port Natal, Bathurst (*Gambia*).

(*Type* ♂ ♀ *Stockholm Mus.*)

♂ **carteri** Wlsm. sp. n. ante 28, Pl. vi. 11 (1889).

Hab. Africa—Bathurst (*Gambia*).

(*Type* ♂ *Mus. Wlsm.*)

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♂ ♀ **derogatella** Wlk.

Exodomorpha derogatella Wlk. Cat. Lp. Ins. B. M. XXIX. 834 (1864); Wlsm. Trans. Ent. Soc. 1881, 271—2: ante 28—29, Pl. vi. 12 (1889).

= *Eretmocera fuscipennis* (var. b.) Z. Handl. Kong. Svensk. Ak. 1852, 97—8; Wlsm. Trans. Ent. Soc. 1881, 271—2: ante 26—7 (1889).

(*Type* ♂ ♀ *Stockholm Mus.*)

Hab. Africa—Limpopo-Gariep District, Port Natal, Zanzibar.

(*Type* ♂ *B. M.*)

♂ **dorsistrigata** Wlsm. sp. n. ante 29—30, Pl. vi. 13 (1889).

Hab. Africa—Zanzibar.

(*Type* ♂ *Mus. Wlsm.*)

(♀?) **lunifera** Z. Handl. Kong. Svensk. Ak. 1852, 100—1; Wlk. Cat. Lp. Ins. B. M. XXIX. 708 (1864); Wlsm. Trans. Ent. Soc. 1881, 272, Pl. xiii. 41: ante 30, Pl. vi. 14 (1889).

Hab. Africa—Limpopo-Gariep District, Natal?.

(*Type* (♀?), *Stockholm Mus.*)

♂ ♀ **miniata** Wlsm. sp. n. ante 30—1, Pl. vi. 15 (1889).

Hab. Africa—Zanzibar, Port Natal.

(*Type* ♂ ♀ *Mus. Wlsm.*)

♂ ♀ **scatospila** Z. Handl. Kong. Svensk. Ak. 1852, 99—100; Wlk. Cat. Lp. Ins. B. M. XXIX. 708 (1864); Wlsm. Trans. Ent. Soc. 1881, 272: ante 31—2, Pl. vi. 16 (1889).

Hab. Africa—Limpopo-Gariep District, Bathurst and Accra (*Gambia*).

(*Type* (♀?), *Stockholm Mus.*)

♂ **basistrigata** Wlsm. sp. n. ante 32—33, Pl. v. (1889).

Hab. Africa—Bathurst (*Gambia*).

(*Type* ♂ *Mus. Wlsm.*)

♂ ♀ **lætissima** Z. Handl. Kong. Svensk. Ak. 1852, 100—1; Wlk. Cat. Lp. Ins. B. M. XXIX. 708 (1864); Wlsm. Trans. Ent. Soc. 1881, 272: ante 33, Pl. vi. 17 (1889).

= *Exodomorpha divisella*, Wlk. Cat. Lp. Ins. B. M. XXIX. 833—4 (1864); Wlsm. Trans. Ent. Soc. 1881, 272: ante 34 (1889).

(*Type* ♂ ♀ *B. M.*)

Hab. Africa—Limpopo-Gariep District, Caffraria, Sierra Leone, Bathurst and Accra (*Gambia*).

(*Type* ♂ *Stockholm Mus.*)

♂ ♀ **impactella** Wlk.

Gelechia impactella Wlk. Cat. Lp. Ins. B. M. XXIX. 637 (1864); Moore, Lp. Ceyl. III. 514 (1887); Wlsm. ante 34 (1889).

Eretmocera impactella Moore Lp. Ceyl. III. 514, Pl. ccix., 10 (1887); Wlsm. ante 34—5, Pl. vi. 18 (1889).

Imago, April.

Hab. Asia—*India*, Dharmsala (Punjab), Barrackpore. *Ceylon Singapore.*

(*Type* ♂ *B. M.*)

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♂ ♀ **chrysias** Meyr.

Castorura chrysias Meyr. Proc. Lin. Soc. N. S. W. (2. s.), I. 1047—8 (1887); Wlsm. ante 9 (1889).
Eretmocera chrysias Wlsm. ante 35, Pl. vi. 19 (1889).
Hab. Australia—Maryborough (Qd.), Sydney (N. S. W.)
(*Type* ♀ *Mus. Macleay*).

♂ ♀ **medinella** Stgr.

Staintonia medinella Stgr., Stett. Ent. Zeit. XX. 250—1 (1859); Stgr. & Wlk. Cat. (II.) No. 2704, p. 324 (1871); Wlk. Cat. Lp. Ins. B. M. XXIX. 701 (1864); Stn. Tin. S. Eur. 142, 157, 340 (1869); Ersch. Fedtsch. Reis. in Turkst. II. 106 (1874); Chr. Hor. Soc. Ent. Ross. XII. 230 (1876); Wlsm. ante 9 (1889).
Eretmocera medinella Wlsm. ante 35—36, Pl. vi. 20 (1889).
Imago. June, on flowers of *Umbelliferæ* and *Senecio*.
Hab. Europe—Chiclana (*Andalus*).
Asia—Krasnowodsk (*Persia*), Samarcand (*Turkestan*).
(*Type* ♂ ♀ *Mus. Stgr.*)

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II. *The Rhynchophorous Coleoptera of Japan.* By David Sharp, M.B., F.L.S., F.Z.S., &c.

Part I. ATTELABIDÆ and RHYNCHITIDÆ.

[Read November 7th, 1888.]

The Rhynchophora brought by Mr. Lewis from Japan fifteen years ago were examined by M. Roelofs, and described by him in some papers that appeared in the 'Annales de la Société entomologique de Belgique,' 1874 and 1880. Since then Mr. Lewis has obtained a much more extensive collection, and, as M. Roelofs is not at present occupied with Entomology, I have undertaken the task of revising the collection by the assistance of this much richer material, and I now deal with the first two families, *Attelabidæ* and *Rhynchitidæ*.

I was surprised to find, on examining the first of these groups, that they form an exception to the other Rhynchophora in the structure of the prosternum: Leconte recently drew attention to the importance of this part of the body as a means of separating the Rhynchophora from other Coleoptera, and it is very curious that he should not have noticed that this family, which he correctly placed at the commencement of the series, differs from his definition of Rhynchophora in this important particular.

In order to define the structure of the prosternum in these insects, I have been obliged to make use of a new term, which I must explain. If the prosternum of one of the larger Apostasimeride Rhynchophora be looked at —*Homalonotus*, for example—it will be found that there are three pieces in the antero-posterior direction of the mesial line—1, the prosternum proper; 2, a piece rather small in size and usually rhomboidal form, for which I find no existent name, and which I have called the centro-sternal piece; 3, the prosternal epimera, joined on the mesial line by a suture more or less obliterated. This same structure may be seen in the Synmerid

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Rhynchophora; here the prosternum is interrupted behind by the cotyloid depressions, behind which may be seen the centro-sternal piece, of variable size according to the genus examined, and behind this again the conjoined epimera. In *Attelabidæ* the centro-sternal piece is absent, and it is clear from what we may see in the next family—*Rhynchitidæ*—that it is by this piece that the apices of the epimera are widely separated, the sutures, however, being greatly obliterated. In *Rhynchitidæ* the structure differs by the centro-sternal piece being nearly always very small, and placed just behind the coxæ, penetrating to a greater or less extent between the apices of the epimera, and in some genera entirely separating them. Thus this family shows that, so far as the prosternal structure is concerned, no sharply-marked distinction exists between Coleoptera with the apices of the prosternal epimera conjoined and Coleoptera with them separated. This exceptional character* in the *Attelabidæ* and *Rhynchitidæ*, combined with the straight antennæ, and the absence of mechanical apparatus in the gizzard (*cf.* Lindeman, Bull. Mosc. li., 1876, p. 161, &c.), indicate that these two families are correctly placed at the commencement of the Rhynchophora.

The habits of the species of *Rhynchitidæ* are very varied, and some of them exhibit very remarkable instincts; and it is therefore interesting to find that the details of their external structure are as varied as their instincts. The fact that there exists so much discrepancy in their structural details, however interesting it may be from a biological point of view, certainly renders the establishment of natural genera a very difficult matter. The form of the rostrum, the structure of the ventral segments and pygidium, and the structure of the hind parts of the prosternum, all vary somewhat from species to species; so that if the genera be founded on any one of them exclusively, the line of division chosen will necessarily be a more or less arbitrary one: by giving attention to more than one character, the genera may, I think, be perhaps made more natural, as it frequently happens that in a species where one character diagnostic of the genus is feeble, a second exists in undiminished

* I do not mean by this that these are the only Rhynchophora in which this character exists; and indeed there are others in which the apices of the epimera are not conjoined.

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degree. Pascoe has frequently remarked that the genera of Rhynchophora are very difficult to deal with on account of the gradual variation of the minor structural characters from which the generic definitions are drawn. This is certainly true in the case of the *Rhynchitidæ*, and, as we are acquainted with only a very small portion of the species existing in the tropics, it is difficult for us to guess where the lines of generic limitation may ultimately best be drawn; so that it is advisable to be cautious in establishing new genera at present, though I fancy that ultimately the genera will have to be considerably increased in numbers.

ATTELABIDÆ.

This family forms an exception to what is normal in the Rhynchophora, owing to its prosternal epimera being widely separated by an interposed piece, to which the epimeral apices are soldered. In this respect it is somewhat similar to *Baridiidæ*, from which group it differs strongly in other particulars, especially by the contiguous and exserted front coxæ, and by the straight antennæ.

APODERUS, *Olivier*, Ent., No. 81, p. 2.

ATTELABUS, *Bedel*, Faune Col. Seine, vi., p. 22.

This genus is peculiar to the Eastern Hemisphere, where it is largely represented by a great number of species in the tropical regions from Madagascar to the Philippine Islands; outside of the tropics the species become less numerous; and Europe possesses no peculiar species, though two or three of the Siberian and eastern species have extended their range to geographical Europe. Japan has, however, fifteen species and several varieties, so that its fauna is, in respect of this genus, Oriental rather than Palæarctic in character.

The species of this genus are very difficult to limit by definition, owing to the variability in colour of many of them, to the frequent great difference between the sexes, and to the fact that some of the male characters vary extremely in the degree of their development. The Japanese species may, however, be grouped in a way that considerably facilitates the determination of the species.

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I. *Antennæ of male provided at the apex with an acuminate appendage; head of male of variable length, according to the individual, and in all the species (except* A. fulvus) *with a cylindrical portion in front of the thoracic articulation.*

This is the only group in which the antennæ have an acuminate appendage; it is very conspicuous in the male sex, and even the females have the termination of the antennæ more acute than they are in the species of the other groups.

Apoderus longicornis.

Apoderus longicornis, Roelofs, Ann. Ent. Belg., xvii., p. 131.

Mr. Lewis has brought back a series of twelve examples of this elegant insect, but all are males; they were procured in several localities, and vary much in the elongation of the head and antennæ, but the coloration of the latter part is constant. The females obtained by Mr. Lewis on his previous journey, and assigned to this species, I am quite unable to distinguish from *A. fulvus;* and the female of *A. longicornis* is perhaps unknown to me. As the two species are extremely closely allied, except in the male characters, it may prove that the females are similar in nearly all respects; but I should anticipate that the black basal joint of the antennæ may be a good diagnostic character.

Found on the main island.

Apoderus nigricollis.

Apoderus nigricollis, Roelofs, Ann. Ent. Belg., xvii., p. 131.

A. montanus, Roelofs (nec Jekel), Ann. Ent. Belg., xvii., p. 134.

A. nigricollis was described by M. Roelofs from three male examples. Mr. Lewis has now met with the species on white beech at Wada-togè, and also in other localities. The male varies much as to the elongation of the head and antennæ, but the species may be readily distinguished in each sex from *A. longicornis* by the coarse sculpture of the upper and under surfaces. *A. montanus* was described from a single female example, and it

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proves to be the other sex of the species whose male only was described, as above mentioned.

Apoderus roelofsi.

Apoderus roelofsi, Har., Deutsche. Ent. Z., 1877, p. 358.

Extremely similar to *A. erythropterus*, var. *atricolor*, but easily distinguished by the more elongate head and antennæ, and by the hind tibiæ being nearly straight externally at the apex. The male varies greatly in size, and in the elongation of the head and antennæ, and in the smallest specimens of this sex the head differs from that of the female only in being less inflated, and in being provided with a very short cylindrical neck behind. Faust, in Deutsche. ent. Z., xxvi., p. 292, has described an *Apoderus coloratus* from Wladiwostock, which he says is closely allied to *A. roelofsi*, but differs in having the hind body flavescent: that would scarcely be a sufficient character to distinguish the two; and I am in some doubt about Faust's species, because he further remarks that the female can be distinguished from the female of *A. nitens*, Roel., *only* by the flavescent hind body; but if *A. coloratus* is allied closely to *roelofsi*, then it may be distinguished with complete certainty from *A. nitens* in each sex by the shape of the lower part of the hind tibia.

A. roelofsi was met with by Mr. Lewis at several localities on the main island, and also at Hakodate, but only in a few examples.

Apoderus fulvus.

Apoderus fulvus, Roelofs, Ann. Soc. Ent. Belg., xvii., p. 130.

The elongation of the head and antennæ in the male of *A. fulvus* is a variable character, and, as the slender posterior portion of the head in the male is not abruptly defined, but is only a gradual attenuation, the species is very difficult to place, and forms, in point of fact, a quite natural transition between Groups I. and II.

Found only in Kiushiu.

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II. *Antennæ without acuminate appendage; hind tibiæ nearly straight at the extremity behind; elytra simply punctate-striate, without humeral denticles or discoidal tubercles; head slender, almost conical, but little different in the two sexes.*

These characters are chiefly negative, but the group is a quite natural one.

Apoderus præcellens, n. s.

Niger, politus, nitidus, antennis tibiis tarsis femorumque posteriorum basubus flavis, corpore supra et infra variabiliter flavo-variegato; prothorace conico, elytris seriatim subtiliter punctatis. Long. 7 mm.

Mas; pectore prominulo, mesosterno anterius in medio fisso et utrinque tuberculo conico instructo; segmento ultimo ventrali medio profunde impresso, impressione utrique cristato, crista setosa.

Head similar in the sexes, conical, gradually narrowed from the eyes to the articulation with the thorax, polished and shining. Thorax very smooth and shining, almost conical, with the disc rather more inflated and convex in the female than it is in the male. Elytra very shining, with regular series of punctures that become very fine behind, the interstices flat and without sculpture.

The remarkable male characters make the identification of this species easy. Usually there is a series of transverse yellow marks across the elytra, a flavescent mark behind the eye and on the base of the thorax, and the ventral segments are more or less flavescent in the middle; but these yellow markings are variable: in none of the specimens before me do they assume, however, the position they occupy in *A. carbonicolor*, Motsch. According to Faust, in Deutsche. Ent. Zeit., xxvi., p. 293, *A. carbonicolor* must be a species allied to *A. præcellens*, and its male likewise presents a curious conformation of the last ventral plate.

Oyama and Nikko, in shady places in the forests.

Apoderus balteatus.

Apoderus balteatus, Roelofs, Ann. Soc. Ent. Belg., xvii., p. 135.

I have seen but few specimens of this species, and cannot speak as to its variation.

Found in Kiushiu.

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Apoderus rufescens.

Apoderus rufescens, Roel., Ann. Soc. Ent. Belg. xvii., p. 135.

This was described by M. Roelofs from a single female. Mr. Lewis has now obtained a small series which I refer to the species with very little doubt, although none of the specimens quite agree with the type; they are all considerably smaller, and nearly all are males; the two or three females have the head slightly shorter than in the typical example. I think it probable that all are one species, the original specimen being a very large individual. This being the case, I find there is very little difference between the sexes of *A. rufescens*, but the male has the head and antennæ slightly longer. The under surface is variable in colour, being more or less streaked with black.

Found at various localities in the main island. M. Roelofs gives Hakodate as the locality of his type, but it is labelled Awomori.

III. *Elytra with acute denticle at the sides just behind the shoulders; head short, scarcely different in the sexes.*

The minute tubercle is the character of this group, but the species are in several other respects quite different from those of the other groups, being of short form, with short antennæ, and frequently having the disc of the elytra furnished with a pair of prominent tubercles. The group may be treated as equivalent to Jekel's subgenus *Hoplapoderus*.

Apoderus latipennis.

Apoderus latipennis, Jekel, Ins. Saund., ii., p. 179.

A. latipennis is apparently a common insect in the main island of Japan, and was procured in several localities.

Apoderus subornatus, n. s.

Brevis, latus, niger, sat nitidus, antennis pedibusque flavis, femoribus posterioribus ad apicem nigris; prothorace disco subtiliter rugoso, lateribus pone humeros denticulatis, disco tuberculis duobus magnis, ad basin dense subtiliter punctatis, ad apicem fere lævigatis. Long. 7½ mm.

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Very closely allied to *A. latipennis*, but larger and broader, and readily distinguished by the very large size of the tubercles on the elytra, and the greater development of the sculpture both of the upper and under surfaces.

Both *A. latipennis* and *A. subornatus* vary a little in their sculpture, especially that of the thorax; but, having examined a considerable number of examples from various localities, I have little doubt of the two being distinct species.

Found at Sapporo and Junsai, on "a low plant," in the island of Yeso, and likewise inhabits East Siberia, as I have a pair from Amurland in my own collection, and there is an example in our national collection from Siberia, labelled *latipennis* by Jekel. *A. latipennis* is recorded in the catalogues of Siberian Coleoptera, but it is probably in error for the present species, as it now appears probable that *A. latipennis* is a more southern insect.

Faust, in his paper on Siberian Curculionidæ, in Deutsche Ent. Z., xxvi., speaks (p. 295) of *A. latipennis*, Jek., with which he says *A. flavimanus*, Motsch. (Schrenck, Amur Reise, p. 171) is identical. I have no means of knowing whether Faust referred—as appears probable—to the species I am now discussing; but Motschoulsky's few remarks do not amount to a description, and do not apply very well to this species, as he says nothing about the dense punctuation of the anterior parts of the wing-cases and other peculiarities.

Apoderus vitticeps.

Apoderus vitticeps, Jekel, Ins. Saund., ii., p. 184.
Hoplapoderus Van Volxemi, Roelofs, C. R. Soc. Ent. Belg., xviii., p. cxxxi.
Apoderus tuberculatus, Harold, Deutsche Ent. Z., 1878, p. 85.

This remarkable species is very variable in colour, no two specimens being quite alike, and the upper surface in extreme specimens has the yellow marks so reduced that it may be described as quite black. The sculpture varies but little, and I entertain no doubt as to the correctness of the above synonymy.

Rare; but occurs on the main island, and on Yezo. Yokosuka, Miyanoshita, Junsai, and Sapporo.

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Apoderus pardalis.

Apoderus pardalis, Vollenh., Tijd. Dierkunde, ii., 1865, p. 164.*
A. tigrinus, Roelofs, Ann. Soc. Ent. Belg., xvii., p. 136.

This species, like so many others of the genus, varies greatly in colour; the black spots of the upper surface extend and coalesce, so that it becomes nearly all black; the lower surface also varies in colour, but not correlatively with the upper, some examples that are quite black beneath having the black spots on the upper surface small.

Kiushiu and main island.

IV. *Hind tibiæ strongly arcuate at the extremity.*

The elytra in this group are regularly punctate in striæ, and the sexual disparity is but slight.

Apoderus erythropterus.

Attelabus erythropterus, Gmel., ed. Linn., 1788, p. 1809.
A. intermedius, Hellw., Schneid. Mag., v., p. 615.
A. politus, Gebl., in Humm., Ess. Ent., iv., p. 50, No. 12 (*fide* Schönherr).
Var. elytris nigris.
Apoderus nitens, Roelofs, Ann. Soc. Ent. Belg., xvii., p. 133.
A. erythropterus, var. *atricolor*, Faust, Hor. Ent. Ross., xxi., p. 28.
Var. niger, pedibus abdomineque fulvo-testaceis.
Apoderus erythrogaster, Vollenh., Tijd. Dierkunde, ii., 1865, p. 165.
A. rufiventris, Roelofs, t. c., p. 135.
Var. thorace ex parte rufo.
A. bicolor, Redtenbacher, Reise Novara, Col., p. 161.
Var. rufus, capite antennis pedibusque nigris.
A. minimus, Roelofs, t. c., p. 136.
Var. niger elytris cyaneis.

* The paper on *Apoderus*, in which this species was described has escaped the notice of the authors of the Munich Catalogue of Coleoptera, and of subsequent writers. It is recorded in Zoological Record I., 1864, where, however, the date is wrongly given.

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After examination of a considerable series of specimens, I can find no characters to distinguish the above forms except colour, and this no doubt is variable, as it is in the well-known *A. coryli*, which runs through an analogous series of colour variations; intermediate individuals are, however, rare, but still they do occur, and I have several such before me.

A. bicolor, Redt., I am acquainted with only by the description, and by Faust's note in Hor. Ent. Ross., xxi., p. 28; this colour-variation has not occurred in Japan as yet, but I mention it because it appears to be the form intermediate between the typical *A. erythropterus* and the Japanese var. *minimus*, Roel.; while the variety recorded by Redtenbacher, with thorax entirely red, is no doubt the same as *A. minimus* itself.

The typical form of *A. erythropterus* is very rare in the parts of Japan visited by Mr. Lewis; he, however, obtained two examples of it at Seba, July 30th, 1881, agreeing entirely with Siberian examples, and with them he obtained two examples with the elytra intermediate between black and red in colour.

A. erythrogaster differs strikingly in the colour of the legs and ventral segments; the colour of the latter parts is, however, very variable in the var. *nitens*, so that I attach no importance to it; and the colour of the legs is so variable in some other species of the genus that I do not think it proper to rely on it alone as a specific character.

Apoderus geminus, n. s.

Niger, nitidus; elytris rufis, regulariter et fortiter seriatim punctatis, interstitiis subconvexis, crebre punctulatis. Long. 4—6 mm.

This is possibly only a variety of sculpture of *A. erythropterus*, but deserves even in that case a separate name; the serial punctures being as deeply impressed on the apical as on the basal portion of the elytra, and the interstices more convex and closely punctate.

A small series was obtained from Kiga, Nikko, and Miyanoshita, on *Lespedeza*.

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V. *Elytra with dense sculpture, amongst which are series of coarse punctures, the third interstice broader than the others, and possessing behind the middle an elongate group of irregularly-placed coarse accessory punctures. To this group belongs the well-known European* A. coryli.

Apoderus jekelii.

Apoderus Jekelii, Roelofs, Ann. Soc. Ent. Belg., xvii., p. 132.

This species is variable in colour, the wing-cases being sometimes concolorous with the other parts of the body, so that the insect is quite black. The male characters vary but little in the small series before me. The species lives on oak, and has been found in Yezo, as well as in the main island and Kiushiu.

Apoderus uniformis, n. s.

Niger, prothorace margine basali elytrisque rufis, his minus nitidis, fortiter seriatim punctatis, interstitiis punctulatis tertio pone medium lato punctis adjectis numerosis. Long. 8 mm., elytrorum 5 mm.

Very similar to *A. jekelii*, but smaller, and with the elytra of a rather brighter red colour, and their sculpture rather more regular and less coarse; but best distinguished by the shorter thorax, and by the male being scarcely different from the female. It is equally close to the European *A. coryli*, but is rather more slender than that species, and has the serial punctuation of the elytra more definite, and the difference between the sexes less. The male of *A. uniformis* has the head just perceptibly longer than the female, and the thorax considerably more conical; the female has the vertex much more convex than it is in *A. coryli*.

The male is readily distinguished from the corresponding sex of *A. jekelii* by the very short head; the females of the two species are very similar, but that of *A. uniformis* has a shorter, more globose, head, and a narrower thorax, with the sides less constricted in front. There is scarcely any difference between the antennæ of the two sexes of *A. uniformis*.

Found at Oyama and Nikko in May and June by

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sweeping the undergrowth in shady glens. E
examples were obtained, six of them being males.

Species of uncertain position.

Apoderus cyanopterus.

Apoderus cyanopterus, Motsch., Et. Ent., ix., 18
p. 22.

This is unknown to me, but I expect will prove t
a blue variety of *A. roelofsi*. The description ag
with that species except in respect of this one particu
Blue varieties of *A. nitens* occur rarely: at pres
I have seen only very few specimens of *A. roelofsi*,
think it probable that individuals with blue upper sur
may likewise occur in it.

ATTELABUS.

ATTELABUS, *Olivier*, Ent., No. 81, p. 4.
CYPHUS, *Bedel*, Faune Col. Seine, vi., p. 23.

The origin of this genus is usually attributed
Linnæus, and in the Munich Catalogue of Coleopt
(viii., p. 2479), the edition xii., 1767, is cited for it.
genus was, however, to the earlier authors, nothing
a name for an unnatural and heterogeneous group
insects of diverse genera, and even families. It is bet
therefore, to credit the genus to Olivier, who was
first to bring it into a satisfactory condition. This
did in the year 1807, and since then his nomenclat
and characters have been universally accepted. Q
recently Bedel has found in the fact that by the ear
authors various genera were mixed under *Attelabu*
pretext for changing the names, and rendering
entomological literature of the last 80 years—so fa
it relates to these insects—useless, or worse than usel
some hundreds of synonyms being created by t
apparently simple change. The 100 species at pres
called *Apoderus* are each and all to become *Attelab*
the 100 species of *Attelabus* are each and all to beco
Cyphus; and the thirty species of *Cyphus* are to beco
Neocyphus (Bedel). In addition to this the numer
genera and subgenera of *Apoderus* and *Attelabus*
scribed by Jekel will become a means of rendering
confusion more confounded. Jekel adopted the plan

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naming many of these divisions by a prefix to the common generic name, using, *e.g.*, *Hoplapoderus* as a subgenus of *Apoderus*; *Heterolabus* as a subgenus of *Attelabus*; and so on. But if Bedel's change were accepted, *Hoplapoderus* would be a subgenus of *Attelabus*, and *Heterolabus* a subgenus of *Cyphus*. I reject the change proposed by Bedel as being a source of the greatest confusion, and as offering no advantage whatever to compensate for this.

Attelabus is widely distributed in the warmer regions of the world, and its species are specially numerous in Tropical America. Japan possesses, so far as we at present know, only three or four species, of which two are Chinese insects, and the other two have their allies in Eastern Asia far to the south.

Attelabus rufipennis.

Phialodes rufipennis, Roelofs, Ann. Soc. Ent. Belg., xvii., p. 138.

? *Attelabus rubripennis*, Chevrolat, C. R. Soc. Ent. Belg., xxi., p. xxxi.

Var. thorace vel ex parte vel in toto testaceo.

Phialodes distinctus, Roelofs, *l. c.*

This remarkable species appears to very variable in the colour of the legs and thorax. Of the few examples I have seen most are intermediate between the form with quite black, and that with quite yellow thorax.

Mr. Lewis procured a single example at Miyanoshita of a very small variety, with shorter antennæ and more obsolete sculpture; and I have a specimen in my own collection of another variety from Assam.

Chevrolat's diagnosis accords with this species except as regards the punctuation of the elytra.

Attelabus lewisii, n. s.

Niger, vertice, thorace, elytris femoribusque anterioribus læte rufis; oculis perconvexis, inter sese longius distantibus; thorace parce punctulato; elytris fortiter seriatim punctatis. Long. 6—7 mm.

Mas, pedibus anterioribus elongatis, tibiis curvatis.

Antennæ rather stout, with elongate, oblong, abrupt, compact, but evidently three-jointed club; rather widely separated at their

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insertion, the longitudinal elevations between them short slight; the eyes remarkably prominent, widely separated, in male rather nearer to the apex of the rostrum than to the fron the thorax, the vertex in the female rather shorter, so that the e are in it rather nearer to the thorax than to the apex of rostrum. Thorax but little punctate, with deep transverse chan in front of the base. Scutellum rather elongate and large. Ely with regular series of punctures, coarse at the base, finer towa the extremity, interstices without sculpture.

Of this distinct species a good series was obtaine exhibiting no variation except that of the sexes. It allied to the East Indian *A. discolor*, Sch., though ve different in colour and sculpture. It also lives in Centr China.

Attelabus cupreus.

Attelabus cupreus, Roelofs, Ann. Ent. Belg., xvi p. 139.

This is apparently the nearest ally yet discovered the Indian *Trachelolabus whitei*, Jekel.

Attelabus cœruleus.

Attelabus cœruleus, Jekel, Ins. Saund., ii., p. 202.

A mutilated specimen—not found by Mr. Lewis hin self—is all the evidence I have seen to confirm thi species as Japanese. It is, I believe, a rather commo insect in Central and Southern China.

EUOPS.

EUOPS, *Schönherr*, Gen. Curc., v., p. 318.

This genus is looked upon by Lacordaire as doubtfull valid, the position of the eyes being, as he says, the onl character given to distinguish it from *Attelabus*. Thi point is, however, not sufficiently constant either i *Attelabus* (inclusive of *Euscelus*) or *Euops* to serve as means of distinguishing the two; but I find, on examinin a series of species, that the sexual characters are peculia in the female sex of *Euops*, so that the genus is a natural one. In the other genera of *Attelabidæ* the female is distinguished from the male by the possession of a second uncus on each of the tibiæ, but in the female of *Euops* this second uncus is not present. On the other hand, this sex possesses, in all the species I have

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seen, a very peculiar character in the presence of a double row of erect pubescence on each of the basal three ventral plates.

Euops is peculiar to the extreme East, where it extends from Japan to Australia. The species are of small size, but some of them of very beautiful coloration.*

Euops splendens.

Attelabus (*Euscelus?*) *splendens*, Roelofs, Ann. Soc. Ent. Belg., xvii., p. 139.

The female of this species possesses the curious double ridges of pubescence on the middle ventral segments that exist likewise in the same sex in the Australian species of the genus. The eyes are not quite contiguous in *E. splendens*. Found on an oak; is not rare.

Euops lespedezæ, n. s.

Attelabus lespedezæ, Lewis, Cat. Col. Jap., No. 1601 (not described).

Niger, elytris violaceis, prothorace disco concentrice punctato, elytris fortiter seriatim punctatis. Long. 3—3½ mm.

The eyes in this species are not really contiguous, though at one spot they are as closely approximated as possible; the vertex is coarsely punctate; the prothorax is rather coarsely punctured in an irregular manner, the punctures on the disc being, as it were, elongated and arranged around a median space; there is a transverse impression across the middle more or less interrupted on the disc, and the basal transverse groove is deep. The scutellum is minute, viridescent. The elytra are of a beautiful dark violet colour, and are deeply punctate with regular series of punctures, which are deeper and coarser at the base than they are nearer to the extremity.

The sexual characters are the same as in *E. splendens*, except that the front tibiæ of the male are not so

* The largest *Euops* I have seen is *E. wallacei*, n. s. ♀. Læte cyaneus, subtus viridi-cyaneus, valde convexus; prothorace parce punctato, elytris regulariter seriatim punctatis, interstitiis paulo convexis. Long. (rostro deflexo) 5 mm. Hab. N. Guinea (A. R. Wallace). Eyes contiguous, vertex subgibbous, club of antennæ elongate. Elytra of a very beautiful blue colour, the sides just behind the shoulders with an excessively minute acute prominence.

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elongate, and that the prominence on the inner margin of the front tibiæ of the female is more abrupt and angular.

Lives on *Lespedeza sieboldi.*

Euops politus.

Attelabus politus, Roelofs, Ann. Soc. Ent. Belg., xvii., p. 140.

In the male of this species the eyes are at one spot as nearly contiguous as can well be; in the female they are very slightly more distant. The front tibiæ are feebly bisinuous on their inner margin, and there is but little difference between the sexes in this respect, the male tibiæ being, however, a little more elongate.

Euops phædonius, n. s.

Cyaneo-viridis, nitidus, prothorace parce punctato, elytris seriatim fortiter punctatis. Long. 4 mm.

Closely allied to *E. politus*, but of a darker colour above, larger in size, with much broader elytra, and certainly distinguished by the eyes being rather larger, so that they are quite confluent at their inner margins. There is but little sexual difference in the front tibiæ; in the female they are a little shorter and thicker, and feebly bisinuous along the inner margin.

A fine series has been brought back by Mr. Lewis. As in the other Japanese species of the genus, the thorax varies a little in its sculpture, but it is finer in *E. phædonius* than in any of the others.

? Euops punctato-striatus.

? Attelabus punctato-striatus, Motsch., Etudes Ent., ix., p. 22.

It would seem probable, from the size given by Motschoulsky, that his species is a *Euops* of the *E. splendens* group, but I cannot reconcile his diagnosis satisfactorily with either of the Japanese species before me, and it is by no means improbable that it may prove not to be a *Euops* at all.

Euops pustulosus, n. s.

Niger, supra æneo-niger; dense punctatus, thorace elytrisque tuberculis plurimis subelevatis. Long. 4 mm.

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Very distinct from the other species of the genus by its peculiar sculpture, which recalls that of a small *Chlamys*. The thorax is densely punctate, but there are two large spaces in front of the base that are somewhat elevated, and are less punctate, and in front of these there are two or three obscure smaller elevations. The punctuation of the elytra is irregular, and each wing-case bears two longitudinal series of elevations that are not punctate. The eyes are contiguous at one small spot in each sex. The male has the front tibiæ rather more slender and elongate than they are in the female, and the truncature of the extremity of the middle tibiæ remarkably elongate.

A good series of specimens on a species of evergreen-oak.

RHYNCHITIDÆ.

This family, as well as the *Attelabidæ*, forms an exception to the normal mode of closure behind of the anterior coxal cavities. Nevertheless, in this respect it is very different from the *Attelabidæ*. In the former family the apices of the epimera are widely separated by a piece that I have called the centro-sternal piece; whereas in *Rhynchitidæ* the points of the epimera sometimes meet, but sometimes are separated by the centro-sternal piece, which latter usually remains small, being, however, larger in *Aderorhinus* than in any other genus in which I have observed it. This character, though variable in the family from species to species, appears to me to offer a valuable means of separating genera. Thus *Rhynchites* differs from *Deporaus* in having the apices of the epimera joined, they being separated by the interposition of the centro-sternal piece in *Deporaus*. This character necessitates the separation of *R. hungaricus* and *R. bicolor* auct. from the other *Rhynchites*, as they have the epimera separated at their apices, and I propose for them the name of *Merhynchites*.*

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* *Merhynchites* nov. gen. *Rhynchitidis* affinis, sed prosterni epimeris apicibus a prosterno separatis. Rostrum elongatum. Pygidium haud occultum. To include *R. hungaricus* and *R. bicolor*, auct. The *R. bicolor* of Leconte, Rhynch. N. America, p. 7, consists of more than one species, as, on examination of two of his so-called "races," I find there are good structural characters to distinguish them.

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Byctiscus.

Byctiscus, *Thomson*, Sk. Col., vii., p. 29; Bedel, Faune Col. Seine, vi., p. 24.

This genus is valid, though the character on which Thomson founded it is erroneous; the hind coxæ are not smaller than they are in *Rhynchites*, and the mode of articulation with the side piece of the metathorax is similar in the two genera; the first ventral plate is, however, lobed so as to cover and conceal the outer part of the coxæ. The genus has, however, been correctly defined by Bedel.

The genus seems most numerous in species in the Oriental regions; until comparatively recently it would have appeared to be more specially European: there are, however, only two species in Europe, whereas I now record five from Japan, and am acquainted with others from China, the Indo-Chinese Peninsula, and East India.

Byctiscus is a most difficult genus as regards the determination of its species. When I made my first study of the Japan collection, I thought too many species had been established in the genus; but a second study, after examination of what has been done by Faust, Roelofs, and others, has led me to believe that it is more probable that the species are rather numerous, but very variable as regards the colour of the upper surface. I am, however, far from entertaining any strong opinion on the point, as the specimens at my disposal are not sufficiently numerous; and, moreover, observations in the field are required.

Byctiscus motschoulskyi.

Rhynchites motschoulskyi, Lewis, Cat. Jap. Col., No. 1607 (not described).

? *R. betuleti*, Motsch., Etudes Ent., ix., p. 21 (not described).

Byctiscus congener, Faust, Deutsche Ent. Z., xxvi., p. 290 (nec Jekel).

Var. ?, elytris purpureo-plagiatis.

Rhynchites princeps, Solsky, Hor. Soc. Ross, viii., p. 284 (?).

R. regalis, Roelofs, Ann. Soc. Ent. Belg, xvii., p. 142.

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I have little doubt, from Faust's remarks, that this is the species referred to by him, *l. c.*, as *R. congener*, but it is not the *R. congener* of Jekel, of which typical examples are in our national collection and my own collection (from coll. Saunders); thus it seems possible that the species may be in want of a description: this I do not make at present, as the Japanese examples before me vary so much that it is possible there may be more than one species amongst them; but the small series,—mostly females,—does not guide me to a conclusion. That the beautiful insect described by M. Roelofs as *R. regalis* is the same species as the larger green examples (*congener*, Faust) is not even quite certain to me, though it is clear that the colour is not of importance in distinguishing it. Under these circumstances I prefer not interfering with the nomenclature.

Byctiscus venustus.

Rhynchites venustus, Pascoe, Ann. N. H. (4), xv., 1875, p. 393.

R. haroldi, Roelofs, C R. Soc. Ent. Belg., xxii., p. liii; and Ann. Soc. Ent. Belg., xxiv., p. 17.

This beautiful insect is extremely variable in the colour of the upper surface, and some of its examples, at first sight, appear almost similar to *B. motschoulskyi*, but *B. venustus* may always be distinguished by the purple-violet colour of the under surface, legs, and scutellum. I have little doubt *R. haroldi*, Roelofs, is this species, although it would be inferred from his remarks as to the male characters, that the sex in question is destitute of thoracic spines:—"La dent des hanches, chez le male, que je n'ai observée chez aucun autre *Rhynchites*, constitute le caractère le plus remarquable de cette espèce. Elle parait remplacer, dans une certaine mesure, les épines si communes chez les ♂ d'autres espèces du genre," *l. c.*, p. 18. This, however, is erroneous; the tubercle on the coxæ is not sexual, but is specific, existing in the female as well as in the male. Moreover, it is present in other species of the genus; extremely slight in *B. betuleti*, so that it can only be detected by a careful examination; it is well-marked in *B. motschoulskyi*, and strongly prominent in *B. regalis*, Roelofs. The discovery of this character is due to

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M. Roelofs, and it is deserving of attention as assistance in the discrimination of the species of most difficult genus.

R. venustus was found on a large-leafed *acer; R. re* on a species of *ampelopsis*.

Byctiscus reversus, n. s.

♂. Supra aurato-purpureus, subtus cum pedibus viol cyaneus; thorace parce punctato, utrinque spina crassa, brevis armato, elytris fortiter irregulariter punctatis. Long. rostro recto, 6 mm.

This is much smaller than *B. venustus*, and, thou have only one example before me, I think it more t probable it will prove to be a distinct species. very short spines on the side of the thorax, the spa punctuation of that part, and the fact that it is elongate, seem to me sufficient for its distinction; tl is very little angular dilatation of the rostrum at sides, and the submental plate is not produced over mouth. Thus I have little doubt we have here a spe intermediate between *B. venustus* and *B. populi*.

Miyanoshita, May, 1880; one specimen.

Byctiscus fausti, n. s.

Minor; infra pedibusque purpureo-cyaneus; supra colore va bilis, vel, auratus vel purpureus vel cyaneus, nitidus fere ab pubescentia, elytris fortiter punctatis, punctis subseriatis. L 4—5 mm.

Mas, thorace utrinque minute spinoso.

Similar to *B. populi*, but with a much shorter rostrum, with antennæ inserted more on the upper surface of the rostrum, so it is compressed between them and very convex; the antennæ are nearer to the eyes, and the surface between the eyes and antennal insertion appears somewhat depressed. In the male thoracic spines are very small, and the submental plate is produced. The species, therefore, is not at all closely allie *B. populi*. The antennæ are very thick, and the basal two jo of the club are transversely quadrate, their margins remark rectilinear. The thorax is sparingly punctate, shining; the el coarsely punctate, with a few finer punctures on the interstices.

× The following species is allied both to *B. fausti* and *B. popu* —*B. parvulus*, n. s. ♂. Minor, infra nigro-cyaneus, supra aur viridis, elytris absque pubescentia, fortius punctatis, thorace ut que minutissime spinoso. Long. cum rostro, 5 mm. Hab. Sibe

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Named in honour of Herr J. Faust, of Liban, in Finland, whose labours on the Rhynchophorous Coleoptera are worthy of high praise.

*Byctiscus lacunipennis.**

Rhynchites lacunipennis, Jekel, Ins. Saunders, ii., p. 225; Roelofs, Ann. Soc. Belg., xvii., p. 140.

Attelabus? cicatricosus, Motsch., in Schrenck. Reise Amur., p. 173.

Byctiscus cicatricosus, Faust, Deutsche Ent. Z., xxvi., p. 291.

This species was described in the same year by Motschoulsky and Jekel; and Faust, remarking this, elected to use the name proposed by Motschoulsky; but he failed to notice that Roelofs had previously made the same remark, and preferred the name given by Jekel. The two names being thus both in use, and apparently of simultaneous origin, I think it is proper to follow M. Roelofs' example.

Rhynchites.

Rhynchites, *Herbst*, Nat. Käf., vii., p. 123.

Dicranognathus, *Redtenbacher*, Hüg. Kaschm., iv., 2, p. 538.

This genus is numerous in species, and probably exists in all the warm and temperate regions of the large continents of both hemispheres: but the exotic species as yet described are not very numerous. *Dicranognathus* is registered by Lacordaire and the authors of the Munich Catalogue as distinct, but the characters given

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orientalis. Allied to *B. populi*, but with shorter rostrum, slender finely punctate thorax, armed in the male with only very minute spines, and with the sculpture of the elytra rather more dense and rugose. The submental plate is produced, and much the same in shape as it is in *B. populi*, but is not so dependent and not so far separated from the mouth.

* The following interesting species, allied to *B. lacunipennis*, greatly extends the geographical range of the genus:—*B. morosus*, n. s. ♀. Cyaneo-violaceus, haud nitidus, thorace dense rugoso; scutello transversim lineare; elytris regulariter, profunde, grosseque seriatim punctatis, interstitiis dense punctatis. Long. 5½ mm. Hab. Laos (Mouhot).

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for it apply completely to *Rhynchites*, and a specimen of Redtenbacher's species in our national collection is apparently rather close to the Japanese *R. ursulus*, Roel.

Rhynchites heros.

Rhynchites heros, Roelofs. Ann. Soc. Ent. Belg., xvii., p. 141.

Var. *R. sumptuosus*, Roelofs, C. R. Soc. Ent. Belg., xviii., p. cxxxii.

This is apparently a very variable species, but I see no characters in the small series before me that would make me suppose it consists of more than one species. Mr. Lewis has not obtained the var. *sumptuosus*.

It is a remarkable fact that in this species the apices of the prosternal epimera are slightly separated, the point of the centro-sternal piece penetrating between them at the base, and their hind margins not closing behind this. Thus it will probably form a genus distinct from *R. auratus* and *bacchus*, to which it is in many characters so very similar.

Feeds on *prunus* and *eriobotrya*.

Rhynchites ursulus.

Rhynchites ursulus, Roel., Ann. Soc. Ent. Belg., xvii., p. 142.

I have broken up a specimen of this remarkable species in order to ascertain the structure of the prosternum, which cannot very well be seen in an unbroken example owing to the hair. It proves to be a true *Rhynchites*, with the prosternal epimera larger than usual, and in front of them a very minute centro-sternal piece. It is a curious fact that in this insect, where the colour of the exposed parts of the body is so different from that of other species of *Rhynchites*, the dorsal plates of the hind body when the wing-cases are opened display the blue colour seen in other species on the outer surface.

Rare, and not recently met with Occurs on a short mountain-oak.

Rhynchites sanguinipennis.

Rhynchites sanguinipennis, Roelofs, Ann. Soc. Ent. Belg., xvii., p. 144.

This has not been met with again, and the male is

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unknown. The species is a true *Rhynchites*, with the prosternal epimera joined behind the coxæ.

Rhynchites plumbeus.

Rhynchites plumbeus, Roelofs, Ann. Soc. Ent. Belg., xvii., p. 143.

The British Museum collection includes a specimen of this species from N. China.

Found on a species of *Bryonia*.

Rhynchites amabilis.

Rhynchites amabilis, Roelofs, Ann. Soc. Ent. Belg., xvii., p. 145.

This was described from two individuals, and two others have now been procured: the sexual differences are very slight, but the male has a rather shorter and thicker rostrum. The species is extremely close to *R. parallelinus*, but the head is a little broader, and there is a slight difference in the sculpture of the base of the elytra; in *R. parallelinus* the sutural stria is continued quite straight to the base; in *R. amabilis* it diverges a little at the scutellum, and there is an additional large puncture placed on the interstice just where it begins to get broader.

Faust has described a species, *R. hirticollis*, from Amur-land, which must be very close to *R. amabilis*.

Rhynchites placidus, n. s.

Cæruleus, pube depressa, pallida vestitus; elytris regulariter seriatim punctatis, seriebus subtilibus, ad apicem obsoletis, interstitiis dense punctatis, interstitio primo ad basin punctis nullis (vel tantum uno) adjectis; prothorace dense sat fortiter punctato; capite lato oculis prominulis. Long. cum rostro, 5 mm.

This is closely allied to *R. amabilis*, but is easily distinguished by the more fine sculpture, and the pallid depressed pubescence. *R. lævior*, Faust, from East Siberia, must also be closely allied to *R. placidus*, but in the Japanese species the thorax is quite as densely punctate as it is in *R. amabilis* and *parallelinus*.

Three examples; Tokio, Yokohama, Junsai.

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Rhynchites funebris, n. s.

Latior, niger, capite brevi sat lato; prothorace densissime punctato, opaco; elytris seriatim punctatis, seriebus subtilibus, interstitiis parce punctatis, nitidis, interstitio primo ad basin punctis nullis (vel tantum uno) adjectis. Long. absque rostro, 5½ mm.; rostri, 2 mm.

This also is allied to *R. amabilis*, but is of large size, entirely black in colour, and has a much finer sculpture. The eyes are not large; the head between them is very deeply and coarsely punctate. The thorax is much narrower than the elytra, rounded at the sides, deeply and very densely punctate, subcarinate along the middle. Elytra with short pubescence, very regular series of fine punctures, and the interstices only finely and quite sparingly punctate.

Sapporo; one example, probably a female.

Rhynchites pilosus.

Rhynchites pilosus, Roelofs, Ann. Soc. Ent. Belg., xvii., p. 145.

Described by M. Roelofs from two individuals. It appears, however, to be the least rare of the Japanese species of the genus, and I have now before me a fine series of examples from various localities, amongst which Yezo is included.

R. pilosus is remarkable from the elongate hairs clothing the surface; these are erect, dark in colour, and by no means dense. The species is not allied to *R. conicus*, but is perhaps more similar to *R. parallelinus:* but it has a narrower thorax, and more scanty punctuation: the series of punctures on the elytra are not placed in striæ, consequently there is not the least elevation of the interstices; the punctures of the interstices are large but not numerous. The difference between the sexes seems very slight: the punctuation of the thorax is denser in some examples; except in this the specimens exhibit little variety.

Rhynchites brevirostris.

Rhynchites brevirostris, Roelofs, Ann. Soc. Ent. Belg., xvii, p. 148.

This also was described from two examples; a male of

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it was, however, returned by M. Roelofs as an undescribed species: his remarks, *l. c.*, as to the sexual distinctions require correction. The male is rarely so large as the female, and has a much narrower head, the distance between the eyes being much less than it is in the other sex; the rostrum is more slender, and not at all dilated at the tip, the mandibles being feeble, and the teeth on their outer edge inconspicuous. These characters bring the species very near to our *R. ophthalmicus*, but *brevirostris* has the serial sculpture on the elytra coarser, the setosity shorter, and the antennæ more slender; so that I think it is a distinct species.

Rhynchites assimilis.

Rhynchites assimilis, Roelofs, Ann. Soc. Ent. Belg., xvii., p. 146.

This is nearer to *R. alliariæ* than to any other of our European species, but the setosity is shorter and the sculpture finer: there are several intercalated punctures at the base of the first interstice. The distinctions of the sexes are slight.

Rhynchites cupreus.

Curculio cupreus, L., Syst. Nat., ed. xii., i., pt. 2, p. 608.

Sapporo; one specimen. This insect has been recorded from Siberia as well as Europe: the identity with the European species is not quite certain on this single example, the colour being more purple.

Rhynchites dybofskyi ?.

? *Rhynchites dybofskyi*, Faust, Deutsche Ent. Z., 1877, p. 289.

Cyaneus, elytris violaceis, parce breviterque pubescens; rostro mediocri; prothorace parvo, subcylindrico, crebrius punctato; elytris seriatim fortiter punctatis, interstitiis subconvexis, fortiter punctatis. Long. cum rostro, 6¼ mm.

Antennæ rather slender; rostrum about as long as the head and the thorax, the latter only about half as broad as the elytra, the punctures rather small, but deep and numerous, the interstices

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shining, not rugulose. Elytra with series of large punctures, as deep behind as in front; the interstices coarsely punctured.

The determination is by no means certain. *R. dybofskyi* appears to have been described from a single male, and was distinguished from *R. cupreus* by the ventral segments not being densely punctate in the male. In our English examples of *R. cupreus* I do not, however, find any sexual difference in the ventral punctuation, and I shall not be surprised if *cupreus* be found to be more variable than has hitherto been supposed; and it may then include perhaps these Siberian and Japanese forms, but the specimens obtained are quite insufficient to decide the question.

Four specimens in bad preservation: one from Tokio, one from Sapporo; also one without locality.

Rhynchites conicus.

Rhynchites conicus, Illig., Mag., vi., p. 306.

Subashiri; Wada-togè, 1st August, 1881. Three examples. This European species has also been found in Siberia.

Rhynchites apertus, n. s.

Minor, viridi-cyaneus, elytris cyaneis; brevissime pubescens; rostro brevi, capite haud lato; prothorace subcylindrico, crebre punctato, sat nitido; elytris seriatim fortiter punctatis, interstitiis subconvexis, parce subtiliter punctatis. Long. cum rostro vix 3 mm.

Rostrum short, in the male only about as long as the head, in the female a little longer; head moderately broad, finely and sparingly punctate. Thorax rather longer than broad, greatly narrower than the elytra, nearly cylindric, rather closely punctate, the punctures neither coarse nor rugulose, the interstices shining. Elytra with series of coarse punctures, with very little punctuation on the narrow subconvex interstices. Legs short and stout, basal joint of the hind tarsi quite short.

This minute species is somewhat near *R. conicus*; the first row of punctures is quite regular at the base, and there are no intercalated punctures.

Six specimens; on the main island, and on Yezo, Kashiwagi, Nagasaki, and Chiuzenji.

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Rhynchites apionoides, n. s.

Minor, cyaneo-niger, brevissime pubescens; capite angusto; prothorace parvo, ruguloso; elytris subtiliter seriatim punctatis, interstitiis haud convexis parce subtiliter punctatis. Long. cum rostro, 3½ mm.

Rostrum moderately stout, scarcely longer than the thorax; head narrow, rather long, coarsely and sparingly punctate. Thorax much narrower than the elytra, a little rounded at the sides, about as long as broad, rugose. Elytra with series of rather fine punctures—towards the apex quite fine—the interstices broad, quite flat, sparingly almost seriately punctate. Legs short.

An obscure little insect, not closely allied to any other species; the difference between the sexes seems very slight.

Plain of Fujisan.

Rhynchites singularis.

Rhynchites singularis, Roelofs, Ann. Soc. Ent. Belg., xvii., p. 147.

Although so peculiar in colour and clothing, this species seems structurally near *R. conicus*.

Rhynchites truncatus, n. s.

Brevis, pube brevi, depressa vestitus, niger, prothorace subsænescente, elytris plumbeo-cyaneis, capite lætius sænescente; dense punctatus; prothorace lato, oculis prominulis. Long. cum rostro, 4 mm.

Antennæ black, with broad moderately long club. Rostrum rather longer than the thorax. Head large, eyes prominent, widely separated, distant from the thoracic margin, the vertex rather closely punctate. Thorax broad, but much narrower than the elytra, subcircular, densely punctate. Elytra with very regular series of moderately coarse punctures, the interstices rather convex, sparingly punctate. Pygidium exposed; legs rather short, the suture between the first and second ventral segments excessively deep.

This is a very peculiar species, and appears to connect *R. tristis* with the more typical forms of the genus.

Miyanoshita, May, 1880.

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Rhynchites tristis ?.

Attelabus tristis, Fab., Ent. Syst , iv., p. 454.

Mr. Lewis obtained a single mutilated male example of an insect closely allied to the European *Rhynchites tristis*, but I think probably distinct therefrom. Faust has described an allied species from East Siberia as *R. depressus*, but I do not think our Japanese insect can possibly be it.

Miyanoshita.

ADERORHINUS, n. g.

Coxæ anteriores elongati. Prosternum post coxas minus breve, epimeris a ligula triangulari separatis. Sutura prima ventrali subobliterata.

This genus has the prosternum formed in a rather different manner to what is usual, the coxæ being placed quite in front, while behind the coxæ the prosternum is longer than usual; the epimera are rather widely separated, and a ligula or tongue projects backwards between them, but is connected with the epimera only at the front part, so that there exists a deep narrow separation, or apparent excision, on each side of the middle. The elytra leave only a portion of the pygidium exposed.

In other respects this insect is peculiar, the rostrum being broad, short, and strongly curved; the maxillæ very large, the submentum also very large, the mentum itself very small: the first and second ventral segments are anchylosed, and are large in comparison with the following segments. There is only one species in the genus, and I do not know any other of the *Rhynchitidæ* that much resembles it. It is allied to *Eugnamptus* by the slender club to the antennæ, and by the ventral segments, but differs strongly from it in appearance, and by the peculiar structure of the apices of the prosternal epimera, as well as by the somewhat shorter basal joint of the hind foot.

Aderorhinus crioceroides.

Rhynchites cricoceroides, Roelofs, Ann. Soc. Ent. Belg., xvii., p. 147.

This is apparently a rare insect, but occurs in Yezo, as well as in the main island, on an evergreen-oak.

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EUGNAMPTUS.

This genus has been distinguished from *Rhynchites* hitherto by no very good character, the best being the greater elongation of the basal joint of the posterior tarsi; this is however variable in both of the genera, and cannot be relied on to define the two genera satisfactorily. *Eugnamptus* is, however, a valid genus, and can be distinguished by other more important characters. The centro-sternal piece of the prosternum is very peculiar in form; it is triangular, with the sides a little curvate, and is acuminate behind; it is interposed between the epimera, with which it is soldered by a very oblique suture on each side; the epimera do not meet behind it, though they project farther back than it, and the space separating their apices is of variable width according to the species, being very broad in *E. aurifrons*, quite narrow in *E. flavipes*.

In *Eugnamptus* the first ventral suture is nearly or quite obliterated, and the pygidium is quite covered by the wing-cases, except that it may be distinguished between their rounded and somewhat divergent apices; the eyes are large, the club of the antennæ elongate, slender, and laxly articulated, and the basal joint of the tarsi is elongate.

The genus will probably prove numerous in species in the tropics of both hemispheres, but I do not think the Eastern species will ultimately be associated in the same genus with those of the New World.

Eugnamptus fragilis, n. s.

Subdepressus, læte cyaneus, nitidus, parce longius setosus, antennis rostro pedibusque nigris; elytris seriatim punctatis, interstitiis fere lævigatis, primo ad basin punctis adjectis circiter sex. Long. cum rostro, 5—5½ mm.

Antennæ very slender, club extremely elongate and loosely articulated. Rostrum broad, expanded towards the tip, and nearly as long as the thorax in the female; in the male more slender, only about as long as the head; eyes very large, larger in the male than in the female. Thorax slender, conico-cylindrical, shining, rather sparingly and not coarsely punctate. Elytra elongate, with regular series of punctures, and shining, flat, not punctate interstices. Legs hairy; basal joint of hind tarsus scarcely so long as the three following together.

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Osaka, July 7th, 1881; Miyanoshita, May, 1880. One pair. Although not taken together, I have no doubt they are the sexes of one species.

Eugnamptus flavipes, n. s.

Niger, thorace subvirescente, capite læte cupreo, elytris antennisque fusco-testaceis, harum clava pedibusque flavis; corpore supra pedibusque minus dense setosellis. Long. cum rostro, 4¼ mm.

The elongate joints of the club of the antennæ are paler than the other joints; the head is sparingly punctate, canaliculate in front; the thorax is subcylindric, longer than broad, coarsely but not rugosely punctate. Elytra with very regular series of coarse punctures, the interstices very slightly convex, impunctate. Ventral segments shining, impunctate, with an elongate, erect, excessively fine scanty pubescence.

Kobé and Fukushima in July, 1881; two specimens.

Eugnamptus aurifrons.

Eugnamptus aurifrons, Roelofs, Ann. Soc. Ent. Belg., xvii., p. 151.

DEPORAUS.

DEPORAUS, *Samouelle*, Ent. Comp., 1819, p. 201.

This genus is entitled to distinction from *Rhynchites*, as has been already stated by Bedel and by Faust. The character they rely on, *viz.*, the exposure of the propygidium, as well as the pygidium, is, however, subject to some exception, as in *D. mannerheimii* and some others the male has only the pygidium exposed. There exists, however, another more important character, for in *Deporaus* the apices of the prosternal epimera are separated by the centro-sternal piece.

Deporaus will probably prove an extensive and varied genus, as I have seen species differing much from one another in appearance and colour, found in the eastern tropics, that must be placed in it.

Faust (Deutsche Ent. Z., xxxi., p. 163) places *Rhynchites tristis* in *Deporaus*. The only certainly authentic example of *R. tristis* at my disposal has the propygidium and part of the pygidium covered by the elytra, and the apices of the epimera are apparently joined; so I have placed the species in *Rhynchites*.

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Deporaus unicolor.

Rhynchites unicolor, Roelofs, Ann. Soc. Ent. Belg., xvii., p. 149.

Deporaus affectatus.

Deporaus affectatus, Faust, Deutsche Ent. Z., xxxi., 1887, p. 163.

Herr Faust describes this species from East Siberia, and also records it from Japan on the authority of one specimen. Mr. Lewis has procured two examples that are distinct from *D. unicolor*, and may be Faust's species; they are more elongate, have the punctures in the series on the wing-cases smaller, and the interstices broader; the antennæ are considerably longer and the eyes larger.

Kiga.

Deporaus fuscipennis, n. s.

Angustus, niger, elytris antennarumque basi fuscis, antennarum clava pedibusque flavis. Long. cum rostro, 4 mm.

Quite similar in form to *D. mannerheimi*, but very different in colour. Antennæ very similar in form to those of *mannerheimi*; rostrum of the female slightly shorter. Head elongate, sparingly punctate, with a large impression in front between the eyes. Thorax very slender, cylindric, but a little narrowed in front, sparingly punctate, disc slightly impressed. Elytra with regular series of rather large deep punctures, interstices narrow, very sparingly punctate. Legs clear yellow.

Chiuzenji, August 23rd, 1881. One specimen of the female sex.

Deporaus mannerheimii.

Rhynchites mannerheimii, Hummel, Ess. ent., iii., p. 45, No. 3, pl. i., f. 4, *a*, *b*, et iv., p. 4.

R. megacephalus, Germ., Ins. Sp. Nov., p. 187.

Var. *R. planipennis*, Roelofs, Ann. Soc. Ent. Belg., xvii., p. 150.

M. Roelofs seems to have had some doubt as to whether his *R. planipennis* was really distinct from the European species. I can find no character of any importance to distinguish the two, and unite them with but little hesitation; the female of the Japanese form has the rostrum rather longer, so that it may be considered a variety.

According to Bergroth and Bedel the trivial name

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mannerheimii is older than *megacephalus*, although it has been usually treated as subsequent.

Deporaus amurensis.

Rhynchites amurensis, Faust, Deutsche Ent. Z., xxvi., p. 285.

Schönfeldt, in his Catalogue Sup., 1888, p. 49, states he has a single example of this species from Tokio.

AULETES.

AULETES, *Schönherr*, Gen. et Spec. Curc., i., 1, p. 243.

I am not acquainted with the typical species, *A. tubicen*, of this genus; it is said to have the claws unappendiculate. If that be the case, the Japanese species here assigned to it will have to be placed in another genus.

Auletes basilaris.

Auletes basilaris (Gyll.), Schön., Curc., v., pt. i., p. 346.

This has not hitherto been recorded from Siberia, but I have examples of it from Amur-land in my collection. Mr. Lewis procured it very sparingly in Japan, at Fukushima, on July 27th, and at Wada-togè on August 1st, 1881.

Auletes puberulus.

Auletes puberulus, Faust, Deutsche Ent. Z., xxvi., 1882, p. 283.

Faust's description was made on an insect found in Amur-land. I refer to it, with some doubt, two specimens in bad preservation, found by Mr. Lewis at Oyama. Though similar to *A. uniformis* in size and colour and pubescence, the species is readily distinguished by the insertion of the antennæ being basal.

Auletes calvus, n. s.

Niger, sat nitidus, fortiter punctatus, antennis minus elongatis, articulis 2o—8m rufo-obscuris. Long. cum rostro, 2½ mm.

Rostrum slender, but rather short, with very little sculpture. Antennæ inserted quite at the base of the rostrum. Head shining, coarsely and closely punctate. Thorax much rounded at the sides,

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closely and coarsely punctate. Elytra also coarsely punctate, the sculpture on the basal part slightly granular.

Ogura lake, July 1st, 1881; a single specimen.

This insect is without any pubescence on the upper surface: it is possible, as I have only one example to judge from, that this may be due to abrasion, but I do not think so; even if that should prove to be the case, the species may be distinguished from the preceding by its smaller size, rather shorter rostrum, antennæ, and thorax. In *A. calvus* the ninth and tenth joints of the antennæ are transverse; in *A. puberulus* this is not the case. The prosternal epimera are, I think, connected together behind the coxæ.

Auletes submaculatus, n. s.

Corpore subtus, capite rostroque nigris, thorace rufo-testaceo, elytris testaceis, pube depressa subvariegatis. Long. cum rostro, 4½ mm.

Rostrum slender; antennæ long and slender, blackish, the bases of each of the middle joints largely yellow. Thorax excessively densely punctate, so as to be almost rugose, but the punctuation is not coarse. Elytra subasperately, but finely sculptured, clothed with a depressed pallid pubescence over a broad space at the base, then bare across the middle, and on each in front of the apex with an irregular ring of pallid pubescence. Legs yellow, apices of the tarsi fuscous. Claws appendiculate.

Of this very distinct species only a single example was found; it is somewat immature. August 27th, 1881.

Auletes fumigatus.

Auletes fumigatus, Roelofs, Ann. Soc. Ent. Belg., xvii., p. 151.

Auletes testaceus.

Auletes testaceus, Roelofs, *l c.*, p. 152.

AULETOBIUS.

DESBROCHERS, *L'Abeille*, v., p. 396.

This genus appears to me entitled to distinction from *Auletes*. The rostrum is broader, the antennæ inserted some distance in front of its base, and in addition, in all

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the species I have examined, viz., *A. politus*, *A. maculipennis*, *A. pubescens*, and *A. uniformis*, the prosternal epimera do not meet behind, whereas in *Auletes* they do. I do not understand for what reason the author, when establishing the genus, placed *A. basilaris* in it, as it does not agree with the characters he ascribed to *Auletobius*.

Auletobius uniformis.

Auletes uniformis, Roelofs, Ann. Soc. Ent. Belg., xvii., p. 152.

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III. *Description of a variety of* Ornithoptera Brookiana (female). By the Rev. Francis Augustus Walker, D.D., F.L.S., &c.

[Read December 5th, 1888.]

The variety of *O. Brookiana* (female) which I here endeavour to describe resembles in some particulars the ordinary type of the male, and has also some resemblance to the ordinary type of the female. I have named it *Eleanor*, and it is the only variety of this singularly handsome and elegant species that I have ever seen. It is the more valuable as even the ordinary type of the female of the species is singularly rare and difficult of acquisition, probably 99 out of every 100 specimens forwarded to this country being males.

Hewitson describes the male as being divided on the anterior wing, below the middle, into seven hastate spots pointing to the outer margin, which they nearly touch. These seven hastate spots of metallic, or according to Hewitson, golden green,—which might perhaps be more appropriately designated triangular patches,—are represented in the variety *Eleanor* by five spots or patches, the sixth, and especially the seventh, consisting of mere streaks. In fact the seventh spot of the male is replaced in this variety by a mere thread of green, only just visible. It is noticeable also that the green patches on the anterior wings are more distinctly divided by a black line than in the male, corresponding in this respect to the posterior wings of the male which Hewitson describes as at the middle divided by the nervures, which are black; and this description of division by black nervures is applicable alike to the posterior wings of the typical male and female, as well as to those of this variety. As regards the metallic-green colour on both the anterior and posterior wings of this specimen, it is brighter than in the ordinary female, being nearly, but not quite, as vivid as in the male. Indeed, the ordinary female can hardly be

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said to have patches, but only streaks converging to a point on the anterior wings, and forming an edging to the dark brown within, which in all the females replaces the velvety black of the male. The shape and position of the green markings on the posterior wings of both the ordinary female and this variety are precisely the same; but, as already indicated, by being brighter in colour in the latter they appear to exceed in quantity those of the typical female.

But the greatest difference between the ordinary female and this variety consists in the total absence in the latter of the dusky pencilling near the apex of the anterior wings, and the very indistinct figuring of the row of spots in the margin of the posterior wings that causes the ordinary female in this respect to resemble a *Diadema*.

The ordinary female has three white spots on the upper part of the border of the posterior wing, and lower down four grey ones; the variety here described has only two smaller white spots, and the grey ones are decidedly more indistinct.

As regards the under side, this specimen is seen to be unmistakeably a female by the dusky pencilling of its anterior wings, in which respect it closely resembles the ordinary female, the male having little or no pencilling there; but in the whitish markings of the posterior wings, it far more nearly resembles the male, possessing less pronounced and smaller markings, and having a less continuous scalloped band than in the ordinary female. Indeed, it has even fewer markings than the male, possessing very slight indications of the second, inner, and fainter band which may be observed both in the typical male and female.

All male specimens of *O. Brookiana* have a tinge of blue within the green on the inner margin of the posterior wings, and near the point of contact with the body. In the ordinary female, and also in the specimen here described, this blue tinge is replaced by a level blue stripe. On the under side of the posterior wings the blue markings of this variety appear to be precisely similar to those of the ordinary female, whereas the male has a third slight additional dash of blue that neither the typical female nor this variety possesses. On the anterior wings (underside) the blue in the male is almost confined to one blue stripe beneath the

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markings of metallic green, and the slighter outer ones of dusky pencilling, and there is also a narrow blue line along that part of the upper margin of the wing nearest the body. This line may be observed both in the type female and in the variety also; but the point in which the sexes differ, as regards the blue markings, is that both females have a parti-coloured patch in the upper segment of the anterior wing, golden green towards the outer and blue towards the inner surface, which is altogether wanting in the male; and also that on the anterior wings of this variety the blue markings predominate, while on those of the ordinary female there is rather more metallic-green. This specimen, which is unfortunately rather worn, and has lost its antennæ, does not differ from the type as regards the red neck collar, or in having, as Hewitson phrases it, "the body belted twice with crimson."

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IV. *Incidental observations in Pedigree* Moth-breeding. By Frederic Merrifield, F.E.S.

[Read December 5th, 1888.]

*The experiments in hereditary moth-breeding which I reported last December are continuing. Of the broods there mentioned the forced *illunaria* have come to an end under circumstances I will describe; the sleeved *illunaria* are continuing in the A and M lines only, the Z line having failed, and the *illustraria* are continuing in all the three lines A, M, and Z. Without giving any detailed account of these experiments,—an account which will be more useful if deferred until they have been continued for some generations longer,—I propose on the present occasion to mention some facts, incidentally observed in the course of them, which appear to have a bearing on questions lately much discussed among naturalists, and may be of interest to members of the Society. I venture to hope also that my statements may elicit suggestions which will be of assistance in the further prosecution of these researches, and may thus perhaps prevent time from being wasted in pursuing them in directions not likely to yield valuable results, and save me from doing what more qualified observers have done before, or are doing much better than I can.

End of forced illunaria.—When my last paper was read on the 7th December, 1887, I exhibited some larvæ of the fifth generation of the year (reckoning the first generation as ending with the *moths* captured in the spring) of forced *illunaria*. At that time the larvæ numbered about 250. Only about thirty emerged as moths, and these appeared between 26th December and

* In some cases where the paper as read stated only general results, I have instead of these given full details, so as to enable others to judge as to the inferences to be drawn from them. These, with some additional explanatory remarks, are distinguished by brackets.

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28th January. They showed unmistakable signs of deterioration, being for the first time smaller than their parents, and being poorer in colouring. All the eggs laid were sterile except one batch, of which 179 turned red. Thinking that the deterioration was probably, in part at least, attributable to the unnatural conditions in which they had been bred, which included continued forcing, and a food supply of winter leaves of evergreen-honeysuckle and rose, I decided to keep back the eggs, and consequently placed them out-of-doors from the beginning of February to the 14th April, a period during which the weather was cold, with much frost, and then forced them. On the 17th April they began to change colour, and in a few days all had turned black, and the young larvæ could be plainly seen through the shells of the eggs, but not one hatched. This experiment seems to show that long exposure to a winter temperature is not directly fatal to the eggs of this species, which under ordinary natural conditions are exposed only to a spring or summer temperature, and suggests the possibility that under changes of climate the insect, which now hibernates as a pupa, might come to hibernate as an egg. It also appears to indicate that the formation of the larva in the egg of this species is not gradual, but awaits the proper conditions, the chief among them being a sufficiently high temperature, and is then rapid. In this deferred development of the latest stage, the egg appears to bear some resemblance to the pupa, the development of which is referred to later on.

Illunaria, spring emergence, male larger than female.—It will perhaps be remembered that last year attention was called to the fact that though the female of *illunaria* in the summer emergence exceeds the male in wing-expansion, there was some reason to think that the reverse was true of the spring emergence. The latter opinion is confirmed by measurements since made of a great number of moths of the spring emergence. [In each of three broods, together numbering 86 males and 107 females, the average size of the male exceeded that of the female, the excess on the average of the whole being 0.26 mm., the largest male being 51 mm., and the largest female 49.50 mm. This compares with an excess on the part of the female in the summer emergence,—arrived at by measuring seven broods

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numbering 244 males and 242 females,—ranging from 1.78 mm. to 4.00 mm. There was an excess in each of the seven broods, and the largest male was 41.93 mm., the largest female 44.68 mm. In *illustraria*, though there is a difference, it is not nearly so considerable; in each of six broods, three being of the spring and three of the summer emergence, the female exceeded the male in size. In the spring emergences, numbering more than 300 individuals, this excess on the part of the female ranged from 1.76 mm. to 2.30 mm., the largest male being 49.60 mm., the largest female 52.20 mm. In the summer emergences of more than 300, the average excess of the female ranged from 2.82 to 4.82 mm., the largest male being 39.50, the largest female 43.90 mm.] In brief, the spring female of *illunaria* is rather smaller than the male, the summer female considerably larger than the male; in both the spring and the summer emergences of *illustraria*, the female is considerably the larger, the difference being, however, less in the spring than in the summer emergence. The conjecture was thrown out last year that the same cause which tends to apterousness in the females of those of our Geometræ whose habit is to appear in the winter might be at work in reducing the wing-expansion of the female in one emergence only,—*viz.*, that which takes place at a cold time of year,—of a moth that has also a summer emergence. With regard to measurement I have found the expansion much more easy to measure accurately than the single-wing length is, and therefore, I now always measure the expansion. To convert the single wing measurement into expansion, it should be doubled, adding about 1-15th in *illustraria*, and 1-17th in *illunaria*. With reference to an inquiry made in my last paper, I may mention that the other English species of the genus *Selenia*, *lunaria*, rests in the position of *illustraria*, not of *illunaria*.

Influence of temperature on size, &c.—I hope the observations which follow may add to the existing materials for information on subjects that must often have seemed perplexing to those who have bred Lepidoptera on a considerable scale; for example, the differences between the spring and summer emergences of *illunaria* and *illustraria* in size and colour; why in some cases a pupa will yield almost immediately to a

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high temperature, in others most reluctantly; how far the temperature affects the size, shape, markings, and colouring of the perfect insect, and in what particular period of development the change is caused. The well-known work of Prof. Weismann, as translated and annotated by Prof. Meldola, throws the greatest light on these questions, but cannot in the nature of things exhaust so large a subject. So far as my experiments on pupæ have gone, the results of them appear in close accordance with those of Prof. Weismann, but other experiments seem to indicate that the temperature to which the larva is exposed in its growing stages has much to do with the colouring of the perfect insect. Difference of size,—a kind of difference associated with seasonal dimorphism, may be supposed to depend on the conditions to which the larva in its growing stages is exposed, rather than on those to which the pupa is subjected. I think this difference of size in the *selenias* experimented on, as between the summer and spring emergences, not overstated at three to four as tested by weight, and five to six as tested by wing-expansion; but these proportions are by no means constant; and, besides the considerable difference in size between individuals of the same brood, there are also great differences between the same emergence, (*i.e.*, spring or summer) in different years.

I will first mention such results obtained as bear on the subject of size. It will be observed, on referring to the table given in my paper of last December, that the broods of *illunaria* forced at a temperature of 75° to 80° or upwards, increased in size from the "second" generation (first summer emergence) to the "third," and from the "third" to the "fourth" (they fell off in the next unhealthy generation); also, that of the three sets of the "second" generation, the sleeved were the smallest, the forced considerably larger, and the "bottled" somewhat larger still; *i.e.*, those which had been bred at an ordinary temperature were considerably smaller than the others, and of those others, such as had the higher temperature were slightly the smaller. 1887 was a very fine, dry, sunshiny summer in the south of England, and June and July were rather above the average in temperature, though all the other months were somewhat below. The summer of 1888 will be

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fresh in the recollection of all as a very cold and wet one: in this year a brood of *illunaria* which I forced was larger, in a greater ratio than in last year, than a corresponding brood sleeved, the average expansion in the forced being 39.08, in the sleeved 38.16: the proportion of perfect moths emerging being also larger in the forced brood than in the sleeved brood. In the 1888 summer broods of *illustraria* the difference is in the same direction, but more marked. Though I did not measure the forced brood, the average size was obviously considerably larger than the corresponding sleeved brood. This sleeved brood, as compared with those sleeved last summer, is smaller and poorer in colour in all three lines, A, M, and Z, and has a larger proportion of cripples. I mention the proportion of perfect moths emerging in connection with size, because both seem greatly dependent on healthiness. In the autumn of 1887, out of 359 larvæ hatched out and sleeved, I obtained 317 pupæ, and bred from them 310 moths, of which but seven were cripples. In the summer of 1888, out of 415 pupæ of the sleeved summer emergence I bred 394 moths, but fully 87 of them were cripples. The case was a great deal worse with the autumn-feeding sleeved larvæ of 1888. Of 394 *illustraria* larvæ hatched out belonging to the A, M, and Z lines of descent, only 175 have pupated, and of these many are misshapen, and will die as pupæ or be cripples, and the average weight of the pupæ is less than 2-3rds that of the corresponding brood last year. Though I do not like to speak positively, I can think of no sufficient cause for this deterioration other than the extreme inclemency of the summer of 1888. The deterioration extends to some pupæ I have proceeding from eggs laid by a wild female taken in the New Forest last August; of 26 recently hatched larvæ sent me from this female in the second week of September, I have only ten in pupa, and the weight does not average much more than 2-3rds of those of last year; such superiority of weight as they show over the others being, perhaps, attributable to the circumstance, that owing to their backwardness I forced them for a time in their earlier stages. The pupæ in the M line of my sleeved *illustraria* are remarkably small, and these happen to have been sleeved on a tree in a particularly cold part

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of my garden. During the very cold week at the beginning of October, my sleeved larvæ seemed to make no growth at all. On the 6th October I brought all indoors and forced them gently, and they had all spun up by the 29th. I may here remark that I shut up some *illustraria* larvæ with birch leaves that were quite sere and yellow, and they ate them; the "frass" was of a yellow-brown.

While speaking of the coldness of the summer, I may mention that Mr. Jenner of Lewes, to whom I gave some *illustraria* eggs in the spring, had fifty or sixty pupate in July, the first of them on the 5th, and the others slowly through the month. Two moths, a male and a female, appeared in July, the rest remaining over. I shall have something more to say of these presently.

One inference I should be inclined to draw from the foregoing observations is that the temperature most conducive to healthiness and large size in *illunaria* and *illustraria*, is one a little higher than that of a warm English summer. As to the cause of the usual difference in size between the spring and the summer emergence, I can at present suggest nothing beyond this, —that the larva of the spring emergence is much longer in feeding up than is the larva of the summer emergence, and I think I have generally observed that where there is no stunting or retarding from unhealthy conditions, those larvæ of a brood which are longest in feeding up are the largest.

As to the causes of variation in colour, markings, and shape, the inquiry is a more complicated one, of course embracing the pupal stage, though I am inclined to think, for reasons I will give, that it should by no means be confined to that stage. My experiments have been in two directions, an artificially high temperature for larva and pupa, and an artificially low one for the pupa, and are concerned with three species, *illunaria*, *illustraria*, and *Ennomos autumnaria* (the old *alniaria*). [In connection with this latter it should be remembered that it does not hibernate as a pupa, and is, I believe, everywhere a single brooded species; I have seen no indication to the contrary after forcing it as larva and pupa, and then forcing for several months the eggs laid by the forced moths.]

Differences in appearance between spring and summer

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emergences of illustraria.—This difference is easily seen, but is perhaps not so easily defined. Besides size and general look, the differences appear to be mainly these: —(1). The contrast between the outer edge of the dark transverse band and the light ground colour of the part of the wing outside it is generally much stronger in the spring emergence, and, indeed, does not usually exist in the summer emergence. (2). The costa is more rounded in the summer emergence, rarely becoming slightly concave in the outer half of the wing, as it often does in the spring emergence. (3). The wings are longer, narrower, and more pointed, and generally, more angulated in the spring emergence. (4). The outer edge of the dark transverse band on the fore wing of the spring emergence, before it curves, almost always forms an obtuse angle with the line of the costa beyond it; in the summer emergence almost always an acute or at most a right angle. (5). The same outer edge, where it approaches the inner edge of the fore wing, generally bends sharply towards the body in the summer emergence: slightly so, or not at all in the spring emergence. [(6). The transparent lunules are generally broader and more conspicuous, when the insect is held up to the light, in the spring than in the summer emergence. (7). The body in the spring emergence is more hairy.] Of all these I think Nos. 1 and 4 the most constant. It may here be observed that in both *illunaria* and *illustraria*, and in both emergences, the female is more angulated, and has more pointed wings than the male; this seems not unusual with those of our *Geometræ* which have any tendency to be angulated.

The variety in markings and colour, and also, I think, in size, I have found much greater in the summer than in the spring emergence [as Prof. Weismann leads us to expect that it would be]. I have endeavoured to increase these differences by selection, and with a beginning of success, as may be seen in the examples I have brought of the extreme forms yet obtained. Some are of a chestnut colour, with few markings above, and of a bright orange, with faint lilac markings beneath.

Effect of forcing on illunaria, illustraria, and autumnaria.—There is a difference of a general kind resulting from the forcing of the larva or pupa, or both, a

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treatment which seems in all three species to produce a generally warmer and yellower hue, with a less amount of dark spots. This is to be noticed in *illunaria*. In the *illustraria* bred by me this effect is masked by the circumstance that the races I have belong mostly to two very different types—a warmly-tinted one with few markings, and a duskier one with conspicuous darker bands and patches. In *autumnaria* the difference is very conspicuous, as will be seen by comparing the forced brood, of which 26 have been preserved out of 29 bred (3 having been sacrificed for eggs) with the sleeved brood, of which 24 have been preserved out of 25 bred; and with the intermediate "bottled" brood: —(1), the general colouring of the forced is warmer; [(2), in all the spots of the forced contrast less strongly with the ground colour; (3), generally, if not always, the spots and marks of the forced ones are less dusky, and (4) not nearly so dark; (5), nearly all the males, and all but one of the females, have fewer spots than the corresponding sexes in the sleeved: on the under side the differences are more strongly marked.] The general result is that of the 26 forced there is only one that comes up to the general standard of the 24 sleeved in abundance and darkness of spotting and other marks, and there are only 3 of the sleeved which in lightness of spots and marks approach the general hue and appearance of the 26 forced.

[*Autumnaria*.—The difference in appearance between the forced and the sleeved being so marked, I give in some detail the facts, which appear to indicate that in this case the conditions to which the larvæ were subjected may have had much to do with the very striking difference in the moths. One of two conclusions at all events seems almost to follow from the experiments, *viz.*, that the larval period was the critical one, or that the colour of the perfect insect in this single-brooded and summer-pupating species can be affected by exposing the pupæ to a very moderate difference of temperature.

The eggs were kindly given to me by Dr. Chapman. There were 4 batches from (1), dark full-sized parents of British origin; (2), large-sized pale parents of unknown origin; (3), a cross between male (1) and female (2); and (4), a cross between male (2) and female (1). I took 10 from each of the 4 batches to make a batch of

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40 for forcing at about 75°—80°, and similarly constituted batches of 40 for bottling and sleeving respectively.

Of the forced, 35 hatched from 21st to 29th May, and 29 emerged between 4th and 18th July, none cripples. The forcing began 21st May, when the first egg hatched, and of these I have a tolerably perfect record, having taken the spun-up ones almost every day from the time they began to spin—17th June—till they finished—1st July—and having recorded in the case of each pupa the date of spinning and of emergence. There were 15 males and 14 females. The larval period averaged 29·8 days, the range apparently being from 27 to 34 days, or more. The pupal period was as follows:—Males, average 16·37 days, range 13 to 18 days; females, average 15·32 days, range 14 to 17 days; average of both 15·86 days. (Pupal period with me commences with the spinning-up, owing to the difficulty of ascertaining when actual pupation begins with a larva that is enclosed in a cocoon. The actual pupal period is therefore several days shorter than that given by me; by 4 or 5 days in the sleeved pupa of *autumnaria*, and the larval period is lengthened in a corresponding degree).

The bottled were not so well attended to as the rest; whether for that reason or not, only 12 emerged, one of which was a cripple, out of 35 hatched between 21st May and 4th June. They were kept as larvæ on a table near the window, which generally stood open, and as they spun up were transferred to a tray at the other end of the room. About 24 spun up between 7th July and 10th August. The pupæ were forced from 12th August (at which time 3 had emerged), and the moths appeared from about 6th to 27th August, 7 males and 5 females, of which one was crippled. As nearly as I can get at them, the larval and pupal periods together averaged between 70 and 80 days, of which the pupal seems to have been about 30 in the males and 28 in the females; about 29½ in both sexes taken together.

Of the sleeved about 30 eggs hatched from 21st May to 4th June. During this period they were kept on the table above referred to. On the 5th they were transferred to a sleeve on a dwarf birch-tree in the garden, which is a cool one; 27 spun up from about 24th July,

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to 29th August. The moths emerged from 17th August to 13th September, having been gently forced (about 65°—70°) from 6th September, after which date 7 or 8 of them emerged. As nearly as I can tell, the larval period averaged about 64, the pupal about 31 days. There were 16 males and 9 females, none crippled. The larval period can only be roughly estimated, as the spun-up ones were only taken when the sleeve was examined at considerable intervals. The first 5 were found 26th July, the next 18 on the 9th August, and as taken they were transferred to a tray indoors, which stood far from the window; I remember that on these occasions there were several that had only just begun to spin up. At this time (9th August) there were 5 larvæ feeding, and they were transferred to a bottle indoors; 2 of them spun up on the 10th August, and one each on the 25th and 29th August; these 4 were also transferred to the tray as they spun up.

The sleeved larvæ were therefore exposed during over 60 days on the average to the cold summer, the temperature of which, as taken about 8 a.m., averaged barely 57°, up to 9th August, when most had spun up. I do not think the temperature during this period ever reached 70° at that hour, and I have no doubt it was at night on one or two occasions near 40°. The temperature in the room where the pupæ stood, taken about 8 a.m., averaged about 66° during the time they were there, *i. e.*, from 24th July to 6th September (often higher, especially during the afternoon, when it must frequently have passed 70°), and rarely much lower. I should doubt if it ever fell below 58°, and that only on rare and brief occasions. I think it may therefore be taken that the pupæ of fully a quarter of the 25 moths which emerged passed their whole existence as pupæ at an average temperature of 66° or upwards, and that nearly all of them passed much the greater portion of their existence at that temperature. The larvæ and pupæ of those described as "bottled," the moths from which in colour and markings are not far short of the sleeved, were never at a lower temperature than that of the room, which, however, averaged several degrees lower for the 6 or 7 weeks preceding 24th July than afterwards.

If the great difference between the forced and the

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sleeved originated in the pupal period, it would seem to follow that the difference between about 66° and about 75°—80° during an exposure of a very few weeks is sufficient in this species for the purpose. It has been suggested to me by Professor Weismann's remarks (pp. 73—5) on the insufficiency of a difference of 14·9° R. (33·5° Fahr.) between the German winter and summer temperatures to originate a climatic variety of *P. podalirius*, while a difference of about 4° R. (= 9° Fahr.) between the summer temperatures of Germany and Sicily is sufficient, and his inference that the cause is to be found in the absolute temperature reached, that the explanation of the difference between the forced and the sleeved *autumnaria* is to be sought rather in the upper than in the lower part of the thermometric range, *i. e.*, in the high temperature to which the forced were exposed, a temperature which, as it happens, closely approximates to the summer temperature of Palermo, 19·4° R. (75·6° Fahr.), rather than the low temperature to which the sleeved were subjected.]

Effect of cold on pupæ of summer emergence. — The observations made as to the effect of cold on the pupa are as follows:—I begin with the effect of icing on pupæ that would in due course emerge in summer. I had 174 sleeved *illustraria* A pupæ, which had spun up from the 4th to the 15th July. All but 39 were forced from the 17th. Nearly all of these emerged, and they did so from the 20th to the 25th July. The 39 (23 males and 16 females), taken indiscriminately, except that large ones were passed over so as not to prejudice the heredity experiments, were on the 17th July exposed to a steady temperature of 33°—34°, and so kept until 1st August, *i. e.*, for 15 days, when they were forced, and all emerged in the 3 days from the 4th to the 7th, except one, which appeared on the 9th. As a whole they are noticeably, but not strongly, darker in hue than the others; in the females especially there is a tendency to the contrast between the dark inner and light outer portion of the wings, which is so marked a feature in the spring emergence.

The effect of icing on the rate of development of pupæ preparing for summer emergence appears, so far as my observations have hitherto gone, to be to arrest [or rather to retard] the development so long as the icing is

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applied and so long only, it being taken up again sharply the moment the change is made from the low temperature to the higher one. [I add some detail on this point, as it seems to indicate either that extreme cold as applied to the pupæ of the summer emergence does not absolutely arrest the development during the period of its application, but allows it to go on slowly so as to shorten the rest of the period, or else causes the development to be more rapid after the icing ceases. The first experiments, of which I have a full record, were with *illunaria*, and the low temperature in this case ranged only from about 40° to 44°, the pupæ not being close to the ice. On the 7th June I took for icing 11 males which had spun up at known dates from 30th May to 7th June, and 3 females which had spun up at known dates between 1st and 7th June. On the 16th June I added to them 6 males and 9 females which had spun up at known dates from 4th to 8th June. All were of the same brood, and had been forced up to the time of removing them to the ice-box. The cooling in this case did not produce any change of colour, or, if any, it is a very slight one. As removed from the ice-box they were replaced in the forcing-box. As compared with those which had remained there all the time, the average period in pupa, exclusive of the days in the ice-box, was as follows :—

	No.	Not cooled. days.	No.	Cooled 7 days. days.	No.	Cooled 16 days. days.
Males ..	19	12·500	6	11·666	11	9·682
Females ..	13	12·192	9	10·833	3	8·500

The record as to the *illustraria* is not so fully kept. These were iced 15 days, and kept at a steady temperature of 33°—34°, *the moths, as a result, being noticeably darker in hue.* I can only get a general average of the time of spinning up, which I assume to be the same for iced as uniced, the former having been taken promiscuously; and, though I have a record of the uniced that emerged next day, my only record as to the iced is that all emerged from the 4th to the 7th August, except 2, which appeared on the 9th. The figures therefore are worth but little; such as they are, they incline in the same direction as those of the *illunaria*, but in a much slighter degree.

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	No.	Not iced. days.	No.	Iced. days.
Males	73	13·042	23	12·652
Females ..	64	13·031	16	12·719

The apparently more rapid development of the female than of the male in *illunaria* (also, as will have been noticed, in *autumnaria*) was unexpected, and probably the experiment has not been on a sufficiently large scale for this apparent result to be relied on. Where there is a difference in priority of emergence of the sexes, I have usually found it rather in favour of the male, so that if the female develops more rapidly in the pupal stage, that would perhaps involve a slower development of that sex in the earlier stages.]

Effect of cold on pupæ of spring emergence.—[I should premise that forcing these, except when it was deferred until they had been some months in pupa, produced very unhealthy results, as shown by the small percentage of survivors and the great proportion of cripples.]

The observations which immediately follow have relation to the effect of temperature on those pupæ which would in due course emerge in spring. In 1887 my second forced brood of mixed *illustraria* (offspring of about 10 pairs), all hatched between 4th and 10th August, and all treated exactly alike, instead of all feeding up, as the *illunaria* had done, split into two divisions; the first, consisting of 28, pupated rapidly between the 22nd and 30th August, and all emerged in perfect condition between 30th Aug. and 8th September, *i. e.*, in from 8 to 9 days. Of the rest, a few died as feeding larvæ, more in pupating, which began 9th Sept., 10 days after the others had left off; but the majority of them became pupæ, and would no doubt, under natural conditions, have remained over until next spring. [This splitting up of a brood into two seems plainly to have been caused by an artificially heightened temperature; in other words, subjecting the *larva* to a heightened temperature caused a portion of the brood, which would otherwise have remained over and appeared as moths in the spring and with the spring colouring, to appear as moths in the same summer and with the summer colouring; *i. e.*, the decisive point was in this case reached in the larval stage, and reached by the application of a high temperature. I am aware that Prof.

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Weismann's experiments show the pupal stage to be one specially affected by temperature. The subject is too considerable to be discussed here, but I venture to point out that two features associated with seasonal dimorphism, *viz.*, the important one of size, and, as it would appear from Mr. W. H. Edwards' experiments, the very important one of shape, are determined in the larval stage; and that in the three species experimented on by me the *larval stage was in fact much shortened* by the high temperature applied (see this paper, *passim*, also Trans. 1888, pp. 130, 131, 132—3); whereas in those experimented on by Prof. Weismann the larval period is stated to have been very little shorter in one brood than in the other, so that the duration would not,—and, it is indeed stated, did not,—engage attention (Weismann, by Meldola, p. 10).] Though kept at a forcing temperature, none emerged until 11th November, a period of more than 2 months; a second appeared on the 12th November; and 5 more appeared between the 9th and 26th December. Six of the seven were cripples, and all the 7 were of the summer type, but duller in colour, and the latest of the 7 are no darker than the earliest. On 7th November, after gradually cooling them down for a fortnight, I put 10 pupæ out-of-doors, where they had a good deal of frost before they were brought indoors on 1st January, a period of 9 weeks. One had come out in the interval, and another appeared 3rd January. From the 9th they were forced, and 4 more appeared between 22nd January and 28th February. All 6 were distinctly of the dark spring type, though rather poor in colouring, and 3 were cripples. In this case a marked effect seems to have been produced on the colouring of the moth by exposing the pupæ to a freezing temperature, [and no such effect produced by considerable retardation without cooling.]

I mentioned some pupæ which Mr. Jenner had, and which, with the exception of 2, would evidently have been single-brooded had they not been subjected to artificial treatment. He kindly lent half of them, consisting of 10 males and 16 females, to me, and on 10th September, 1888, I placed them in a forcing-box, which was kept at 75°—80°, except for the first fortnight in October, when, for reasons connected with another experiment, it stood at 60°—65°. Nine emerged, all

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females, on the following dates: Sept. 27 (2), 30, Oct. 3, 7, 8, 14, 16, 19. The one which emerged 8th October was accidentally destroyed, the remaining 8 (exhibited) are of the same general colouring, which seems to be intermediate between the spring and summer colouring, and differs most materially from that of the 2 which emerged in July. The later ones of the 8 are much darker than the earlier ones, and, though the progressive darkening is not quite regular, it is difficult to look at them without thinking that retardation of development has been the operative cause, the retardation in this case not being associated with cold, as the pupæ have rarely or never been at a lower temperature than 60° [There are some other facts which rather favour the view that retardation without cold may be a cause of, or at least be associated with, darkening. Thus the numerous specimens I have preserved of *illunaria* show that where one or more of a brood have emerged several days after the rest they are often in a marked degree different in colour, generally darker. And a sleeved female *illustraria* of the summer emergence of 1888 before mentioned, which was rather behind the others in feeding up and was not forced at the end, and which, instead of corresponding with the average period of about 13½ days (of which 3½ forced) remained from 20 to 22 days in pupa, makes as near an approach in general hue to the spring emergence as do the iced ones of that brood.]

Simultaneously with the offspring of the forced *illustraria* of the 1887 summer emergence, I brought up some 29 in a bottle at the ordinary indoor temperature, and the pupæ remained at the same. They showed no tendency to split up, but, of the 20 that spun up, all did so between 12th September and 5th October. Ten were on 27th November put out-of-doors, and were brought in 1st January, and, after being gradually warmed, were on 9th January placed in the forcing-box, and kept there at 65°—70°. These straggled greatly in their emergence, *viz.*, Jan. 28, Feb. 13, 14, 15, 16 (2), 17, 23 (2), and 28; 5 others, without being frosted, were on 29th January placed in the forcing-box; these emerged Feb. 9 (3) and Feb. 11 (2); 5 others, not frosted, were on 3rd March placed in the forcing-box, and they emerged March 9 (1), 10 (1), and 11 (3). All the 20 were perfectly healthy specimens. Comparing the first 10 with the

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second 5, it looks as if the frosting in this case had the specific effect of causing the subsequent partial retardation and great irregularity in emergence, an irregularity represented by a range of from 19 to 50 days, though the facts as to the other 2 lots of 5 each which emerged respectively in 11—13 days and 6—8 days seem to show that the earliness of the date at which the forcing began had something to do with this. All are of the spring type, and there is no marked difference between those which have been frosted and the rest. I have reason to think the unfrosted pupæ were never at a lower temperature than 40°, which therefore, if and so far as lowness of temperature is a cause of this dark colouring, appears to be low enough for the purpose in *illustraria*.

Effects of forcing in different cases.—It seems to be an interesting question what are the causes which determine whether the pupæ of a double-brooded moth shall fall into the category of those that will emerge in spring, or into the category of those that will emerge in summer. There is of course a very real distinction between the two categories, one obstinately resisting for months a high temperature to which the other succumbs in a few days; and part of a brood will range itself in one category, and the rest of it, though subjected to exactly the same conditions, in the other. The different behaviour, with me, of the two species will be noticed, *illunaria* yielding several forced broods in succession, while *illustraria* gave one and part only of the next. The case of *illunaria* proves, if proof were needed, that it is not a case of alternative succession of the two different forms, while the instance given of the forced *illustraria* splitting into two shows that some other cause than a difference of temperature must be concerned in occasioning it. Though temperature appears to have so little effect on a pupa that is not ripe for it, the effect of it on a pupa which is ripe for its operation seems immediate and tolerably regular, both with the spring and the summer emergence. [I give a summary of the effect of forcing on the pupæ of some considerable broods:—

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SLEEVED ILLUNARIA.

Spring emergence (3 broods).	♂	♀	Total.	*Summer emergence* (2 broods).	♂	♀	Total.
Apr. 16. Forcing began				July 17. Forcing began			
„ 18. Emergence of	0	+ 1	= 1	„ 17. Emergence of	0	+ 1	= 1
„ 19. „	27	+ 31	= 58	„ 18. „	4	+ 9	= 13
„ 20. „	56	+ 53	= 109	„ 19. „	18	+ 24	= 42
„ 21. „	13	+ 26	= 39	„ 20. „	28	+ 20	= 48
„ 22. „	1	+ 8	= 9	„ 21. „	11	+ 11	= 22
				„ 22. „	8	+ 2	= 10
				„ 23. „	1	+ 2	= 3
				„ 24. „	0	+ 2	= 2
Individuals	97	+ 119	= 216	Individuals	70	+ 71	= 141

SLEEVED ILLUSTRARIA.

Spring emergence (3 broods).	♂	♀	Total.	*Summer emergence* (3 broods).	♂	♀	Total.
May 10. Forcing began				July 17. Forcing began			
„ 11. Emergence of	1	+ 0	= 1	„ 20. Emergence of	3	+ 3	= 6
„ 12. „	59	+ 6	= 65	„ 21 „	56	+ 31	= 87
„ 13. „	94	+ 97	= 191	„ 22 „	96	+ 83	= 179
„ 14. „	6	+ 46	= 52	„ 23 „	52	+ 38	= 90
„ 15. „	0	+ 1	= 1	„ 24 „	10	+ 9	= 19
				„ 25 „	0	+ 3	= 3
				Aug. 4—6 (not forced).....		1	= 1
Individuals	160	+ 150	= 310	Individuals	217	+ 168	= 385

It will be observed in the case of the spring emergence that when the winter was well over and the pupæ may have been supposed to be ripe for emergence on suitable conditions presenting themselves, the *illunaria* nearly all emerged in from 3 to 5 days after the forcing was applied, more than half of them on the 4th day, and the *illustraria* nearly all emerged in from 2 to 4 days after the forcing was applied, more than half of them on the 3rd day.] It seems as if under the most favourable conditions it took several days to go through the changes that intervene between the comparatively torpid central period of pupal existence and the winged stage, and that, as the icing experiments appear to indicate, a "cold snap" occurring during any part of this active later period may suspend these changes for a time, but produce no great effect besides. I suppose there is a

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point in the life of a pupa when it may be said that a corner is turned, and that the last stage of development has begun, a point that seems indicated in *E. versicolora* by the pupa's forcing itself out of its cocoon, the pupæ that do not thus come up remaining over till another year. It is, I believe, a common observation in collecting that it takes several warm days in succession to bring out the moths that emerge in spring, and that after such a succession they often become rather suddenly plentiful. A passing remark on the usefulness of the forcing-box will not be out of place here; with some experience it should enable one who is breeding insects to bring them out almost to the day [if in combination with a sufficiently capacious ice-chest] at the time when he may be able to attend to them; without such appliances the heredity experiments as to size would be rendered much more difficult, as in warm weather a considerable percentage of moths, if kept a few days, though in the dark, flutter so as to damage their wing-tips, and make it impossible to measure them.

One general result of the experiments appears to be that cold applied in the earlier stages (there being strong indications that the larval period is one) in the life of the 3 species experimented on, 2 of these species being double-brooded, and one single-brooded, has a tendency, operating possibly by retardation, to produce or develop a darker hue in the perfect insect: if so, it may perhaps throw some light on the melanism so often remarked in north-country examples of widely-distributed moths.

In conclusion, I hope to be allowed to say that I feel as strongly as any one can that the record of my experiments would have been more satisfactory to others, as it certainly would have been to me, had it been deferred until they could have been brought nearer completion. But I trust the reason which decided me to offer them in this imperfect form may be thought a sufficient excuse, the reason being that I hoped others might be induced to follow them up in the various directions in which they point, and that, as to such as I may be able to prosecute, I may receive suggestions enabling me to conduct them the better. I have a great many recorded observations other than those I have made use of here, and they are entirely at the service of any who are interested in the subject; they give, in a tabular form,

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the parentage, birth, and life-history of considerably more than a thousand individual moths, which have been preserved. I have to thank the Editors of the 'Entomologist's Monthly Magazine' and the 'Entomologist' for their help in drawing attention to my desire to obtain living examples of *illustraria* from other regions than the South and East of England (especially from regions where it is single-brooded, as I believe it is in Perthshire and in Scandinavia), as materials for the inquiries I am desirous of prosecuting; this assistance has not yet borne fruit, but the insect is not a common one, and I hope it may some day find its way to me from these distant parts.

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V. *On a collection of Lepidoptera from Kiukiang.* By John Henry Leech, B.A., F.L.S., F.Z.S., F.R.G.S., &c.

[Read December 5th, 1888.]

Plates VII., VIII., & IX.

The materials for this paper were collected for me during the months of April, May, June, and July, 1887, by Mr. A. E. Pratt, in the neighbourhood of Kiukiang (which is situated on the Yangzeé River, about 500 miles from the sea). The collection is not rich in species, probably only representing about one-sixth part of the lepidopterous fauna; it contains, however, a fair proportion of new species, and also many that have not hitherto been recorded from that region. The larger proportion of species are common to the eastern coast of China, and Japan, but many occur also in the Himalayas. The chief point of interest in the collection is the variation exhibited in so many species, especially in *Papilio Sarpedon* and *Melanargia halimede*.

1. *Euplœa midamus*, Linn.; Kirby, Cat. Diurn. Lep., p. 15.

Two examples only.

2. *Lethe butleri*, n. s. (Pl. VIII., fig. 8).

Wings in both sexes smoky brown, with their margins traversed by a slender pale band intersected by a line somewhat darker than the ground colour.

Male. Outer third of primaries rather paler than rest of wing. One small ocellus near the tip. Towards the outer margin of secondaries are two or sometimes three ocelli, that nearest to the anal angle being the largest, and always having a white pupil, though this varies in size, and is scarcely visible in some specimens.

Female. Larger than the male. Outer third of primaries paler.

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Often there are two ocelli situated one below the other near the apex, and sometimes a third lower down towards the outer angle. Ocelli on secondaries vary from two to four in number, and are arranged along and parallel with the outer margin; the lower pair always the largest.

Under surface of both sexes pale greyish brown, with a pale band intersected by a dark wavy line, and bordered internally by a dark serrated line running parallel with the outer margins. Venation prominent. Outer third of primaries paler and separated by a dark brown wavy line. Discoidal cell divided by a dark line. Parallel to the outer margin are two, three, or four ocelli, that nearer the apex being much the largest.

The markings on the secondaries are a dark basal streak from costa to the submedian nervure; beyond this is another dark streak starting from the costa, and, after skirting ocellus at anterior angle, forms a deep elbow towards the outer margin, and then strikes off in an oblique direction towards the anal angle. Parallel with outer margin is a series of six ocelli, that near the costa being the largest and nearly twice the size of No. 5, the next largest. Nos. 4 and 6 are about equal, but the latter sometimes exhibits a tendency to gemination. The costal ocelli can be faintly seen on the upper surface.

Expanse, ♂ 58—62 mm., ♀ 68 mm.

8. *Lethe naias*, n. s. (Pl. VIII., fig. 4).

Male. Blackish brown, apical third slightly paler, a pale band intersected by a line of the ground colour on the outer margins of all the wings, but most distinct on the secondaries. Two faintly outlined ocelli near apex of primaries and five on secondaries; of these last the fourth and fifth are the most distinct, the white pupils and pale irides being well-marked. The others are very indistinct, and appear to be the ocelli of the under side showing through the wing.

Female. Similar to the male, but larger and a shade paler in colour. Fringes pale whitish brown.

Under surface: colour same as on the upper side in both sexes. Primaries: two ocelli near apex with white pupils and yellow irides well-developed, and on the outer margin are a greyish violet wavy line and one of pale brown, narrowly separated by the ground colour. Secondaries: a narrow transverse streak of greyish violet, edged internally with dark brown before the middle of the wing, and another of the same colour bordered externally with a darker shade of ground colour beyond the middle of wing. This,

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starting from the anterior margin in the direction of inner margin, is suddenly diverted towards the outer margin, but after reaching the 2nd subcostal nervule it resumes its original course, and terminates at the anal angle. Six very distinct white-pupiled ocelli: of these No. 1 on the anterior margin and No. 5 are the largest, whilst that at the anal angle has two white pupils. Each ocellus is placed within a ring of greyish violet; on the outer margin lines similar to those on primaries. Fringes as above.

Expanse, ♂ 64 mm., ♀ 68 mm.

A common insect at Kiukiang.

4. *Lethe syrcis*, Hew., Ex. Butt., iv., *Deb.*, t. iii., figs. 13, 14; Oberth., Et. Ent., vi., t. vii., fig. 8.

I received a long series of this fine species.

5. *Neope? muirheadii*, Feld., Wien. Ent. Mon., vi., p. 28 (Jan., 1862).

? *Debis segonax*, Hew., Exot. Butt., iii., *Deb.*, t. i., fig. 5 (June, 1862).

Neope segonacia, Oberth., Et. Ent., vii., fig. 4.

Fairly common at Kiukiang, and is there a most variable insect.

6. *Melanargia halimede*, Mén., Schrenk's Reise, p. 37, t. iii., figs. 6, 7. Var. *meridionalis*, Feld., Wien. Ent. Mon., vi., p. 29 (1862). (Pl. VIII., figs. 5, 6).

"A *M. halimede* amurensi hæc varietas circa Ningpo proveniens colore differt fusco prædominante fasciisque albis idcirco angustioribus. Ad sectionem *M. lacheseos*, Hübn., egregia species pertinet."

As will be seen by Felder's remarks quoted above, it is expressly stated that the dark colouring predominates in var. *meridionalis*. This is invariably the case with specimens from Ningpo and Kiukiang, but not with those from Amurland or Corea. The majority of Ningpo examples are nearly, some entirely, black; the same applies to those from Kiukiang. Figs. 5 and 6 represent the palest and darkest examples selected from over 130 specimens from the last-named locality. Corean *halimede* are darker than Amurland examples, but from neither of these localities has anything dark enough for var.

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meridionalis been received; the form usually known by this name is really only an intermediate between Felder's variety and the type, and such is Romanoff's fig. 10, pl. xvi., in 'Memoirs sur les lepidoptères.'

Herr Honrath ('Entomologische Nachrichten,' xiv., p. 161) describes a variety of *M. halimede* from Kiukiang, and there is little doubt the specimens he refers to were some of my duplicates. The form he refers to as *lugens* is an intermediate between the two examples I have figured.

7. *Palæonympha opalina*, Butl., Trans. Ent. Soc. Lond., 1871, p. 404; Lep. Exot., p. 86, pl. xxxiii., fig. 3.

Of this rare species I received a long series; it seems to be constant.

8. *Satyrus dryas*, Scop., Ent. Carn., p. 158 (1763).
Satyrus bipunctatus, Motsch., Et. Ent., ix., p. 29.
Var. *sibirica*, Staud., Cat., p. 29.

Judging from the number of specimens sent this must be one of the most abundant species in Central China.

9. *Mycalesis regalis*, n. s. (Pl. VIII., figs. 2 ♂, 2*a*, ♀).

Male. Ground colour of all the wings blackish brown with violet reflections. Primaries traversed by a broad lilac-blue fascia from the 1st subcostal nervule to the anal angle, its inner edge touching the discoidal cell.

Female. Has the male colouring, but the violet reflections are more subdued. Lilac-blue fascia much narrower and more curved. All the wings with more rounded outer margins.

Under side of both sexes chocolate. Outer margins of primaries broadly bluish grey, with a violet tinge, enclosing a row of five, sometimes six, small ocelli, beyond which is an angulated double line of the ground colour. Outer margin of secondaries bluish grey, intersected by a wavy line of the ground colour. A submarginal series of from five to seven ocelli with white pupils and reddish brown irides, of which the second, third, and seventh, counting from the anterior margin, are often very faint. Internal to the ocelli is a series of bluish grey crescents.

Head, thorax, and upper surface of abdomen black. Legs and under surface of abbomen dark chocolate. Antennæ black,

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chequered with white beneath; tips and under side of club deep orange.

Expanse, ♂ 55—58 mm., ♀ 50—54 mm.

Except that the narrower blue fascia on primaries of the female resembles the same character in *Bicyclus iccius*, and that the general colour of the wings on upper surface is something like that of *Mycalesis martius*, Fabr., this insect is quite distinct from any known species, and appears to be without any close ally.

I received 18 specimens (12 males and 6 females).

10. *Mycalesis gotama*, Moore, Cat. Lep. E. I. C., i., p. 232 (1857); Trans. Ent. Soc. Lond., 1880, p. 157.

Seems fairly common, and does not vary.

11. *Mycalesis perdiccas*, Hew., Exot. Butt., iii., *Myc.*, t. iii., fig. 15 (1862).

Mycalesis sangaica, Butl., Ann. & Mag. Nat. Hist. (4), xix., p. 95.

Much commoner than *gotama*. It agrees well with the Japanese form.

12. *Ypthima motschulskyi*, Brem. & Grey, Schmett. Nordl. China, p. 8; Mén., Cat. Mus. Petr., i., t. vi., fig. 5.

I received upwards of a hundred specimens of this species, and these vary extremely both in size and markings, as also in number and disposition of ocelli.

13. *Ypthima sakra*, Moore, Cat. Lep. E. I. C., i., p. 286, No. 508 (1857); Hew., Trans. Ent. Soc. Lond. (3), ii., p. 290, t. 18, fig. 18 (1865).

Constant in markings and easily distinguished from *motschulskyi* by reference to the under surface, where there is a double ocellus at the outer angle of hind wings. The species does not appear to be common.

14. *Ypthima baldus*, Fab., Syst. Ent., 323 (1793).

Ypthima argus, Butl., Journ. Linn. Soc., Zool., ix., p. 55 (1866).

Y. zodia, Butl., Trans. Ent. Soc. Lond., 1871, p. 402.

Y. evanescens, Butl., Ann. & Mag. Nat. Hist. (5), vii., p. 134.

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The specimens from Kiukiang show a remarkable amount of variation in the size of the ocelli on the under surface of the hind wings. All the forms enumerated above are represented together with the intermediate connecting-links.

15. *Acræa vesta*, Fabr., Mant. Ins., ii., p. 14 (1787); Don., Ins. China, t. 30, f. 1 (1799); Kirby, Cat. Diurn. Lep., p. 135.

Appears to be very common and exceedingly variable.

16. *Argynnis sagana*, Doubl., Gen., t. xxiv., fig. 1, ♂ (1850).

Damora paulina, Nordm. Bull. Mosc., 1851, iv., p. 440, t. xii., figs. 1, 2, ♀.

Very common, and does not differ in the least from Japanese specimens.

17. *Argynnis paphia*, Linn.

♀ var. *valesina*, Esp.

The specimens are rather larger than those from Europe, and the females are all of the *valesina* form, some, however, being darker than others.

18. *Argynnis laodice*, Pall., Reise, i., p. 470 (1771).

Var. *japonica*, Mén., Cat., ii., p. 152, t. x., fig. 3.

The specimens are of the *japonica* form, but larger. Appears to be plentiful at Kiukiang.

19. *Argynnis anadyomene*, Feld., Wien. Ent. Mon., vi., p. 25 (1862).

Argynnis ella, Brem., Lep. Ost.-Sib., p. 94, t. viii., fig. 1 (1864).

Very common at Kiukiang.

20. *Argynnis niphe*, Linn.

Common, and does not differ from Japanese specimens.

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21. *Argynnis adippe*, Linn.; P. Z. S., 1887, p. 42, 3, No. 103.

I received a fine series of this species. The specimens are larger than any I have seen from other localities, but not so variable as those from Japan and Corea.

22. *Argynnis nerippe*, Feld., Wien. Ent. Mon., vi., p. 24 (1862).

Argynnis coreana, Butl., Ann. Mag. Nat. Hist. (5), ix., p. 15.

Appears to be commoner than *adippe* at Kiukiang.

23. *Melitæa* (?) *maculata*, Br. & Grey, Schmett. Nordl. China, p. 7, t. i., fig. 3 (1853).

Argynnis leopardina, Lucas, Ann. Soc. Ent. de France, 1866, p. 221, t. iii., fig. 3.

I received four specimens of this interesting species from Kiukiang.

24. *Vanessa c-album*, Linn.; P. Z. S., 1887, p. 420.

The Kiukiang form of this species is very large and pale, and seems to occur abundantly.

25. *Vanessa c-aureum*, Linn.

Vanessa angelica, Cram., Pap. Exot., iv., t. 388, figs. G, H.

Appears to be a common insect.

26. *Vanessa charonia*, Drury, Exot. Ent., i., t. 15 (1773); Brem., Lep. Ost.-Sib., p. 18.

Seems very common; none of the specimens, however, approach the var. *glauconia*, Motsch.

This species does not seem to be as plentiful as the last at Kiukiang.

27. *Pyrameis indica.*

Papilio atalanta indica, Herbst.
Vanessa callirhoë, Fabr.

Some examples are very close to var. *vulcania.*

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28. *Vanessa cardui*, Linn.

A few specimens of the usual type.

29. *Hestina assimilis*, Linn.

I received a long series of this fine species from Kiukiang.

30. *Limenitis sydyi*, Led., Verh. Zool. Bot. Ges., 1853, p. 357, t. i., fig. 3.

This species appears to be fairly constant at Kiukiang and there is no tendency to aberration in the direction of var. *latefasciata*, Mén.

31. *Limenitis helmanni*, Led., Verh. Zool. Bot. Ges., 1853, p. 356, t. i., fig. 4.

The specimens from Kiukiang are larger than those from Amurland, Corea, and Japan.

32. *Neptis aceris*, Lep., Reise, i., p. 208, t. xvii., figs. 5, 6.

Var. *intermedia*, Pryer.

Seems very common at Kiukiang, and agrees perfectly with the Japanese form.

33. *Neptis eurynome*, West. Don., Ins. China (2nd ed.), p. 66 (1842).

Papilio leucothoë, Don., Ins. Chin., t. 35, fig. 3 (1798).

This species also seems common at Kiukiang.

34. *Neptis pryeri*, Butl., Trans. Ent. Soc. Lond., 1871, p. 561; Lep. Exot., pl. 63, fig. 4; Jans., Cist. Ent., ii., p. 155.

Limenitis arboretorum, Oberth., Et. Ent., ii., p. 24, t. iii., fig. 3.

The Chinese specimens do not differ in the least from Japanese and Corean. The species appears to be very common at Kiukiang.

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35. *Athyma sulpitia*, Cram., Pap. Exot., iii., t. 214, 1782.

Var. *ningpoana*, Feld., Wien. Ent. Mon., vi., p. 26.

A fairly long series of this species shows but little variation of importance; the two white dashes in the cell, however, are sometimes confluent.

36. *Athyma fortuna*, n. s. (Pl. VIII., figs. 1 ♂, 1*a*, ♀).

Male. Upper surface smoky black, with a slight purplish reflection in certain lights. Primaries: discal streak club-shaped, entire; discal band represented by a series of nine white or opaline spots, of which the third, fourth, and fifth, as also the eighth and ninth, are only separated by the nerves. Two small spots and a faint curved linear mark at the outer angle are the only submarginal markings. Secondaries: a broad and almost straight central white or opaline band, interrupted only by the subcostal nervule, and on the hind margin a white or opaline bar tapering from the anal angle towards the costa, and intersected by the nervules forming a series of six spots.

Female. Upper surface brownish black. Discal streak terminates in a dot beyond the cell. Markings as in the male, but spots smaller and of a creamy tint. Fringes white, chequered with black at the extremities of the nervules.

Under surface of all the wings orange-brown. The discal area and a quadrate spot at anal angle of primaries black. White markings much as on upper surface, but more confluent, and the streak terminates in a sharp point just outside the cell. There is also a whitish line bounding the lower two-thirds of outer margin, and two small white spots, one above and the other directly below the discal streak. A series of black crescent-shaped marks commencing near the costa, and, skirting the external edges of apical spots, runs parallel with outer margin to black spot at anal angle. These marks are bordered externally with white. Markings on the secondaries as on the upper surface, but with the addition of a fairly broad basal streak, which is bluish grey in the male, but white in female, and bluish grey abdominal fold. Expanse, ♂ 74 mm. ♀ 84 mm.

This species is most nearly allied to *Athyma jina*, Moore, from which, however, it can easily be distinguished by the narrower discal streak, and by the absence of white abdominal belt. On the upper surface it also bears a superficial resemblance to *A. sulpitia*, Cram., but the character of the discal streak and the

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markings of the under surface at once separate it from that species.

37. *Apatura ilia*, Schiff., S. V., p. 172.

Apatura here, Feld., Wien. Ent. Mon., vi., p. 27 (1862).

All the specimens received from Kiukiang belong to the form *here*, though individually they vary considerably. I have forms of var. *metis* from S. Russia, which agree very well with some of the Chinese specimens.

38. *Apatura subalba*, Pouj, Ann. Soc. Ent. Fr., 1885, p. ccvii.

Only five examples of this magnificent species were sent me. The type, which is rather smaller and a very bad specimen, is in the Paris Museum, and was taken by the Abbé David in Thibet.

39. *Charaxes narcæus*, Hew., Exot. Butt., i., *Nymph.*, t. 1, figs. 1, 4 (1854).

Var. *mandarinus*, Feld., Reise Nov. Lep., iii., p. 437, n. 710 (1867).

Both type and variety of this fine species seem to be common at Kiukiang.

40. *Polyommatus phlæas*, Linn.

Var. *chinensis*, Feld., Verh. Zool. Bot. Ges. Wien., xii., 488 (1862).

Var. *eleus*, Fab.

Both varieties appear to be common at Kiukiang.

41. *Lycæna argiades*, Pall.; Proc. Zool. Soc., 1887, p. 415.

Kiukiang representatives of this species vary greatly both in size and colour.

42. *Lycæna fischeri*, Eversm., Bull. M., 1843, iii., 537; H.-S., 218, 9.

Lycæna davidi, Pouj., Ann. Soc. Fr., 1884, p. cxxxv.

L. filicaudis, Pryer.

A few specimens, which do not differ from those taken by me at Ningpo and Corea.

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43. *Lycæna argia*, Mén., Cat. Mus. Petr., ii., p. 125, t. x., fig. 7; P. Z. S., 1887, p. 415.

Lycæna opalina, Pouj., Ann. Soc. Ent. Fr., 1885, cxliii.

Agrees well with Japanese specimens.

44. *Lycæna argiolus*, Linn.

Lycæna ladonides, de l'Orza, Lép. Jap., p. 20.
L. levetti, Butl., Ann. & Mag. Nat. Hist. (5), xi., p. 111.

Seems fairly common at Kiukiang.

45. *Lycæna moorei*, n. s. (Pl. VII., fig. 4).

Male. Upper surface: all the wings smoky black. Fringes of primaries dusky, rather paler at anal angle; those of the secondaries white, with some darker scales at the extremities of the nervules, giving a slight chequered appearance. Under surface pale grey. Primaries with an elongated discoidal and a central series of six black spots; the last is linear, and all are surrounded with whitish. On the outer margin is a series of black marks more or less V-like in shape; these are bordered on each side with whitish, and precede a black line interrupted by the nervules. Secondaries: three basal spots, that on the anterior margin being large and somewhat triangular in shape, whilst the third is dot-like, and situated on the extreme edge of abdominal fold; an elongated discoidal and a central series of seven spots, the initial one being large and almost round, third and sixth oval,—these, as also one between the discoidal and first spot of central series, are black. A submarginal series of V-shaped black marks, a row of marks, chiefly small and linear, but including one large round spot, edged internally with orange, between the submedian nervure and first median nervule. Fringes grey, with a black line at their base.

Female. Same as male in colour and arrangement of markings, but spots on under surface are larger, especially those of central series on secondaries.

Expanse, 29 mm.

Though not closely allied to any known species, this insect has a superficial resemblance to *Lycæna fischeri*, Ev., but the absence of any caudal appendage at once separates it from that species. The arrangement of spots on under surface is also very different. From *Meletus hamada*, Druce, which it agrees with on the upper surface, it may be distinguished by the very

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different under side maculation and the less chequered fringes.

Only three examples (two males, one female) were received from Kiukiang, but these show sundry modifications in size and shape of the spots, and in one specimen the spot between the discoidal and costal is only present on the right secondary.

46. *Niphanda fusca.*

Thecla fusca, Brem. & Grey, Schmett. Nordl. China's, p. 9 (1853); Proc. Zool. Soc., 1887, 410, n. 31.

Seems common at Kiukiang.

47. *Thecla w-album*, var. *eximia*, Fixsn.

Kiukiang specimens agree well with the type of Fixsen's *eximia*, which is in the collection of the Grand Duke Nicholas. That insect, however, has nothing whatever to do with *T. w-album*, and is either a distinct species or *T. grandis*, Feld. Felder's description seems to apply to my insect, but as I have not seen an example of *T. grandis*, and as there is no figure available for comparison, I am unable to say positively whether it is referable to that species or not.

48. *Thecla micans*, Brem. & Grey, Schmett. N. China's, p. 9 (1853).

Thecla betuloides, Blanch., Compt. Rend., lxxii., p. 810 (1871).

Three or four specimens taken in May or June.

49. *Thecla pratti*, n. s. (Pl. VII., fig. 4).

Male. Primaries black, with violet reflections over the discal area. Secondaries black, with the exception of a violet suffusion, bounded by two imaginary lines drawn from the base of wing, and terminating respectively at the anal angle and the extremity of the first subcostal nervule. Tails black tipped with white; anal lunule red. Fringes of all the wings pale, but becoming darker towards the apex of primaries.

Female. Uniformly smoky black. Anal lunule reddish orange,

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bordered on its inner margin by a few bluish scales. Fringes of all the wings white, merging into black at the apex of primaries.

Under side: all the wings whitish grey. Primaries with a short darker transverse bar at the end of discal cell, beyond which is a darker broken band running from the costa towards the inner margin. Secondaries with two small dark spots near the base of wing, and a short darkish discal bar; beyond this is an irregular arrangement of darkish markings. Above the tail is a small black spot surrounded with yellow, a slender streak of which colour runs parallel with the hind margin to the black anal lunule, and then, turning at a right angle, traverses a third of the abdominal fold.

Expanse, 32 mm.

This species is variable on the under side both in shade of colour and in the intensity of the markings. In these respects four of the six specimens I received from Kiukiang differ somewhat from the examples described above. The anal lunule on upper surface of secondaries is also subject to variation, as in one example it is pale yellow, and in another bluish.

I took a few specimens of this insect at Foochau in April, 1886.

50. *Curetis acuta*, Moore, Ann. & Mag. Nat. Hist. (4), xx., p. 50.

Occurs in July, and cannot be distinguished from Japanese specimens.

51. *Amblypodia rama*, Koll., Hug. Kaschm., iv., 2, p. 412, t. 4, figs. 1, 2 (1848); Hew., Cat. Lyc. B. M., vii., fig. 72 (1862).

Amblypodia querceti, Moore, Cat. Lep. E. I. C., i., p. 43, n. 64 (1857).

♀ *A. dodonæa*, Moore, *l. c.*, n. 65, t. i. *a*, fig. 8 (1857).

Seems to be fairly plentiful in July.

52. *Amblypodia avidiena*, Hew., Ent. Mo. Mag., 1877, p. 108.

I only received one example of this interesting species.

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53. *Terias læta*, Boisd., Sp. Gén., i., p. 674.

Var. *jægeri*, Mén., Cat. Mus. Petr., p. 84, t. ii., fig. 1 (1855).

Terias subfervens, Butl., Ann. & Mag. Nat. Hist. (5), xi., p. 278 (1883).

A few hybernated specimens, which do not show any material difference from Japanese specimens.

54. *Terias hecabe*, Linn.; P. Z. S., 1887, p. 409, n. 26.

As plentiful and as variable at Kiukiang as in Japan. Series includes most of the named forms.

55. *Terias bethesba*, Janson, Cist. Ent., ii., p. 272 (1878).

Two specimens (male and female) taken in July. I believe this species has not been previously recorded from China.

56. *Pieris rapæ*, Linn.

Pieris crucivora, Boisd., Sp. Gén., i., p. 522 (1836).

Var. *orientalis*, Oberth., Et. Ent., v., p. 13 (1880).

The specimens I received from Kiukiang are very variable, and this is especially noticeable in the males. These usually have one or two spots on the fore wing, but in some examples the disc of the wing is immaculate. The apical patch of fore wing may be either very faintly indicated or strongly developed.

57. *Pieris canidia*, Sparrm.

Pieris gliciria, Cram., Pap. Exot., ii., t. 171, fig. E, F.

P. clavipennis, Butl., Ann. & Mag. Nat. Hist. (4), xix., p. 96.

P. sordida, Butl.

Black spots on fore wing two or one, sometimes entirely absent. This species seems to be common at Kiukiang.

58. *Pieris napi*, Linn.

Var. *melete*, Mén., Cat. Mus. Petr., ii., p. 113, t. x., figs. 1, 2 (1855); P. Z. S., 1887, p. 407, n. 16.

The examples of this species from Kiukiang are larger and the markings more distinct than in any

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specimens I have from Japan. Compared with female *napi* from other localities, the under side of hind wings are of a richer and much deeper yellow. Marking and shape of wing variable.

59. *Callidryas crocale*, Cram., Pap. Exot., i., t. 55, figs. C, D.

Callidryas jugurtha, Cram., *op. c.*, ii. t. 187, figs. E, F.

Only one example.

60. *Rhodocera rhamni*, Linn.

Rhodocera nipalensis, Doubl., Gen. Diurn. Lep., p. 71 (1847).

R. maxima, Butl., Trans. Ent. Soc. Lond., 1885, p. 407.

Specimens from Kiukiang are larger and deeper coloured than any others with which I am acquainted.

Rhodocera acuminata, Feld. (Wien. Ent. Mon., vi., p. 23, 1862), also occurs at Kiukiang. I am unable to form an opinion as to whether it is a variety of *R. rhamni* or a distinct species. The females are very easily distinguished, but I have some males which appear to be intermediate between *acuminata* and *rhamni*.

61. *Colias hyale*, Linn.; P. Z. S., 1887, p. 408, n. 23.

Seems common, and is as variable as in Japan. The yellow form of the female appears to predominate.

62. *Sericinus telamon*, Don., Ins. China, t. xxvii., fig. 1 (1798); P. Z. S., 1887, 404, n. 12.

Seems common at Kiukiang. I have received over one hundred specimens, among which are individuals corresponding in every particular with the named forms, and also intermediates linking one form with another.

63. *Papilio elwesi*, n. s. (Pl. VII., fig. 1).

Male. Ground colour of all the wings black. Primaries and anterior portion of secondaries thickly sprinkled with whitish scales on each side of the nervures and nervules, which gives the insect a grey and streaked appearance. Posterior portion of

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secondaries black with a bluish tinge, ornamented with five deep red crescent-shaped marks and an ocellus; the latter is bordered with white on its external edge, and is situated at the anal angle. Along the outer margin are four small red marks, bordered externally with white, that situated between the extremities of the first and second median nervules being much the largest. Under surface; colour, and ornamentation similar to these characters on the upper side, but somewhat fainter. Head, thorax, and legs black. Body bluish black.

Expanse, 156 mm.

This species can at once be separated from any other known *Papilio* by its broad spatulated tails, which are traversed to their margins by *two* (the 2nd and 3rd median) nervules. (Pl. VII., fig. 1 *a*).

I only received two examples of this interesting species.

64. *Papilio aristolochiæ*, Fabr., Syst. Ent., p. 443 (1775).

Appears to be very common at Kiukiang. Extremely variable in marking, especially as regards the spots on hind wings, which may be either 2, 3, 4, or 5 in number. One female example has five of these spots on one hind wing, and none on the opposite one.

65. *Papilio pamnon*, Linn.

Var. *borealis*, Feld., Wein. Ent. Mon., vi., p. 22 (1862).

This does not appear to be a common species at Kiukiang. The specimens are larger than those I have from Foochau and Hongkong, and the female has much more red on the hind wings. The females from Kiukiang (four in number) vary exceedingly.

66. *Papilio bianor*, Cram., Pap. Exot., ii., t. 103, fig. c (1779); Lep. Jap. & Cor., P. Z. S., 1887, 404.

Appears fairly plentiful. The spring form, which closely resembles the var. *japonica*, Butl., seems rarer than the summer form. Over a hundred examples were received from Kiukiang, and no two of these are alike; the variation is greater than obtained among the specimens from Japan.

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67. *Papilio demetrius*, Cram., Pap. Exot., iv., t. 385, figs. E, F (1882).

Var. *carpenteri*, Butl., Ann. Mag. Nat. Hist. (5), x., p. 318.

A single male specimen taken in June.

68. *Papilio alcinous*, Klug, Neue Schmett., t. i. (1836).

Papilio alcinous, var., Gray, Cat. Lep. Ins., pl. iv., figs. 2, 3.

P. mencius, Feld., Wien. Ent. Mon., vi., p. 22 (1862).

P. spathatus, Butl., Ann. & Mag. Nat. Hist. (5), vii., p. 139.

P. plutonius, Oberth., Et. Ent., ii., p. 16, t. iii., fig. 2 (1876).

After comparing hundreds of specimens from China and Japan, I am unable to find sufficient differences to separate the above forms. M. Oberthur, Et. Ent., ii., p. 16, mentions the shape and length of tails, shape of hind wings, and red spots as characters by which the forms may be distinguished. In an extensive series of specimens, however, such as that before me, it is seen that all these characters are subject to considerable modification, so that it is not possible to place reliance upon them.

69. *Papilio sarpedon*, L., var. (Pl. VII., fig. 2).

The variety figured is the common form of *P. sarpedon* at Kiukiang, and differs from the type in being without the band-like series of blue spots on secondaries. Other examples are intermediate,* and connect the variety with the type. Ningpo and Ichang specimens exhibit no tendency whatever to vary in the direction of this form.

70. *Papilio xuthus*, Linn.

Var. *xuthulus*, Brem., Lep. Ost.-Sib., p. 4, t. i., fig. 2.

Both forms, as well as intermediates, occur commonly.

* One of these has been named var. *semifasciatus* by Herr Honrath, Entom. Nachr., xiv., p. 161 (June, 1888).

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71. *Papilio machaon*, Linn.

Var. *asiatica*, Mén., Enum., i., p. 70 (1855).
Var. *hippocrates*, Feld, Verh. Zool.-bot. Ges. Wien., xiv., p. 314.

All the specimens received from Kiukiang belong to the forms *asiatica* and *hippocrates*; they are extremely variable both as regards size, colour, and markings.

72. *Papilio macilentus*, Janson, Cist. Ent., ii., p. 158.

Papilio tractipennis, Butl., Ann. & Mag. Nat. Hist. (5), vii., p. 139.
P. scævola, Oberth., Et. Ent., iv., p. 37.

I received six specimens of this species, only one of which was of the female sex. It does not differ in any way from the Japanese form.

73. *Ismene badra*, Moore, Cat. Lep. E. I. C., i., p. 245 (1865).

One specimen, which agrees well with N. Indian examples of this species, except as regards the anal angle of hind wing, which in *badra* is rather more produced.

74. *Pamphila mathias*, Fabr., Ent. Syst, Suppl., 433 (1798).

Only three specimens of this species were sent me.

75. *Pamphila oceia*, Hew., Desc. Hesp., p. 31, n. 22 (1868).

Six or eight specimens, all agreeing with those bearing this name in Mr. Moore's collection.

76. *Pamphila guttata*, Murr., P. Z. S., 1881, p. 912.

Eudamus guttatus, Brem. & Grey, Schmett. Nordl. China's, p. 10 (1855).
Goniloba guttata, Mén., Cat. Mus. Petr., i., t. v., fig. 4 (1857).

Seems to be rare at Kiukiang.

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77. *Pamphila fortunei*, Feld., Reise Nov., t. 72, fig. 11.

One specimen only.

This is probably a form of *pellucida*, Murray, but I can form no definite opinion without a longer series.

78. *Pamphila prominens*, Moore.

Gegenes sinensis, Mab., Bull. Soc. Zool. Fr., 1877, p. 231.

In the Hewitson collection, amongst insects named *mohopaani*, Wall., is a specimen agreeing well with my Chinese examples. The specimen referred to bears two tickets of locality, one N. India and the other W. Nile; the former is probably the correct one.

I received eight or ten specimens from Kiukiang.

79. *Pamphila mencia*, Moore, Ann. & Mag. Nat. Hist. (4), xx., p. 52.

Four examples.

80. *Gegenes hainanus*, Moore, P. Z. S., 1878, p. 703.

Two specimens received, which agree well with Mr. Moore's type.

81. *Hesperia sylvatica*, Brem., Lep. Ost.-Sib., p. 34, t. iii., fig. 10.

Appears to be common at Kiukiang.

The specimens are somewhat darker than those from Japan, but none approach the form *leonina*, Butl.

82. *Syricthus maculatus*, Brem. & Grey, Schmett. Nordl. China's, p. 11.

A few examples only. They differ in no way from Japanese specimens.

83. *Plesioneura bifasciata.*

Eudamas bifasciatus, Brem. & Grey, Schmett. N. China's, p. 10 (1853).

Gonilobia bifasciata, Mén., Cat. Mus. Petr., Lep., i., t. v., fig. 3 (1855).

This seems to be a scarce insect at Kiukiang. The

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specimens do not differ from those which I took at Ningpo and in the Corea.

84. *Tagiades nymphealis*, Speyer, Stett. Ent. Zeit., 1879, p. 348.

About ten fine specimens of this large Hesperid, which appears to be closely allied to *Satarupa gopala*, Moore, from Sikkim.

85. *Pterygospidea maculosa*, Feld., Reise Nov., p. 528, t. 73, n. 7 (1867).

A large number of very fine specimens of this beautiful species.

86. *Pterygospidea sinica*, Feld., Wien. Ent. Mon., vi., p. 30 (1862).

Pterygospidea moorei, Mab., Bull. Soc. Ent. France (5), vi., p. clii. (1876).
Daimio felderi, Butl., Ann. & Mag. Nat. Hist. (4), vii., p. 140.

Appears to be common at Kiukiang.

87. *Pterygospidea davidii*, Mab., Bull. Soc. Ent. France (5), vi., p. 54 (1876).

A nice series.

88. *Antigonus vasava*, Moore, P. Z. S., 1865, p. 786.

A fine series, showing some slight differences in the hyaline maculation of secondaries and towards base of primaries. Agree well with specimens from Ningpo.

89. *Acherontia atropos*, Linn.

Acherontia styx, Westw., Cab. Orient. Ent., 88, pl. 42, fig. 3.
A. medusa, Butl., Trans. Zool. Soc., ix., 597 (1876); Ill. Typ. Lep. Het., pt. iii., p. 3, pl. xli., fig. 5.

Five specimens, all of which agree with Japanese examples in my collection. Absence of black bands on the under surface of abdomen, by which it is claimed *medusa* and *styx* may be separated from *Atropos*, is not

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a trustworthy character, as in some European specimens these bands are not present on the ventral surface, whilst some Chinese and Japanese examples exhibit distinct traces of such bands.

90. *Acherontia morta.* Hübn., Verz. Schmett., 140, 1496.
Acherontia atropos, var., Cram., Pap. Exot., iii., 74, pl. 237, fig. A.
A. lethe, Westw., Cab. Orient. Ent., 87, pl. 42, fig. 2.
A. satanas, Boisd., Hist. Nat. Lep., pl. xvi., fig. 1.
Only one specimen, agreeing exactly with example from Punjaub in my collection, taken by me at Murree.

91. *Smerinthus ocellatus*, Linn.
Smerinthus planus, Walk., Cat. Lep. Het., viii., 254 (N. China).
S. argus, Mén., Cat. Mus. Petr., p. 94, No. 1561.
Two specimens.

92. *Smerinthus dissimilis*, Brem., Lep. Ost.-Sib., p. 35, t. iii., fig. 12.
One example, much more rosy than specimens from Amurland.

93. *Ampelophaga rubiginosa*, Brem. und Grey, Beitr. zur Schmett. Faun. Nord. China, p. 52.
Appears to be fairly common at Kiukiang.

94. *Clanis bilineata*, Walk., Cat. Lep. Het., Suppl., v., 1857 (1866); Butl., Ill. Typ. Lep. Het., pt. v., 14, pl. lxxxi., fig. 4 (1881).
Only one example.

95. *Acosmeryx anceus*, Cram., Pap. Exot., iv., 124, pl. 355, fig. A.
One example only.

96. *Daphnusa colligata*, Walk., Cat. Lep. Het., viii., 238 (1856).
Metagastes bieti, Oberth., Lep. du Thibet, p. 29, pl. i., fig. 2 (1886).
A single specimen.

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97. *Lophura sangaica*, Butl., P. Z. S., 1875, p. 621.
One example only.

98. *Diludia increta*, Walk., Cat. Lep. Het., Suppl., i., p. 36 (1864); Butl., Ill. Typ. Lep. Het., pt. iii., pl. xli., fig. 7 (1879).
Two examples differing greatly in size, as also in colour of hind wings.

99. *Chærocampa japonica*, Boisd., Ins. Lep. Het., i., 241.
One example.

100. *Chærocampa silhetensis*, Walk., Cat. Lep. Het., viii., p. 143 (1856); Butl., Ill. Typ. Lep. Het., pt. v., p. 8, pl. lxxix., fig. 6.
Chærocampa bisecta, Moore, *cf.* Butl., *l. c.*
One example.

101. *Chærocampa elpenor*, Linn.
Chærocampa lewisii, Butl., Proc. Zool. Soc., 1875, p. 247.
Several specimens from Kiukiang.
Except that it is more rosy on hind margin of anterior wings, *lewisii*, Butl., is not separable from typical *C. elpenor*. Some European examples of *C. elpenor* in my collection are quite as rosy as *lewisii*.

102. *Pergesa mongoliana*, Butl., Proc. Zool. Soc., p. 622 (1875); Ill. Typ. Lep. Het., pt. ii., p. 2, pl. xxi., fig. 5.
Four specimens differing in size and markings.

103. *Leucophlebia lineata*, Westw., Cab. Orient. Ent., p. 46, pl. xxii., fig. 2.
One specimen.

104. *Macroglossa pyrrhosticta*, Butl., Proc. Zool. Soc., 1875, 242, pl. xxxvi., fig. 8.
Several specimens. Variable.

105. *Macroglossa bombylans*, Boisd., Ins. Lep. Het., i., 334 (1874).
Two specimens.

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106. *Sataspes infernalis*, Westw., Cab. Or. Ent., p. 61, pl. 30, fig. 3 (1848).

One male example without the typical blue markings, but with the basal half of all the wings blackish, and some patches of bluish-grey scales, especially near the thorax.

107. *Hemaris radians*, Walk., Cat. Lep. Het., viii., 84; Butl., Ill. Typ. Lep. Het., pt. ii., p. 1, pl. xxi., fig. 2.

One specimen.

108. *Sciapteron chinense*, n. s. (Pl. VII., fig. 5).

Primaries purplish black, with a few brownish scales scattered over the centre and on hind margin of the wing, and a small patch of yellow scales at the base. Secondaries hyaline, slightly smoky towards the margins; fringes and neuration black, as also are the head, thorax, and abdomen, but the latter is encircled by three orange bands of uniform width at equal distances apart. Collar yellow, pectus marked with orange. Antennæ black, slightly pectinated in the male. Legs black, tarsi of anterior pair paler.

Expanse, ♂ 30 mm., ♀ 39 mm.

This species may be distinguished from *Sciapteron regale*, Butl., by its much longer and more slender body, by the absence of orange markings on head and thorax, and by the equal size and greater width of the abdominal bands. From *S. cuprealis*, Moore, it may be separated by the position of the bands, which in that species are situated one near the junction with thorax, and other two towards apex of body.

Two specimens, male and female, taken near Kiukiang in June.

HYPERTHYRUS, n. g.

Palpi projecting beyond the head, 2nd joint densely clothed with hair, 3rd joint, which is one-fourth the length of 2nd, barely scaled. Antennæ filiform. Abdomen tapering sharply posteriorly. Costa of primaries straight to apex, which is slightly curved, the outer margin twice indented at angle. Secondaries half the length of primaries, outer margin indented.

Something of the appearance of *Thyris*, but differing in its much more elongate primaries. Type, *Hyperthyris aperta*.

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109. *Hyperthyrus aperta*, n. s. (Pl. VII., fig. 7).

Primaries hyaline, golden brown at base, and with a triangle on costa, submarginal band and the veins blackish; outer margin fuscous tinged with golden brown, and sparsely scaled. Secondaries hyaline, costa and wide outer border blackish; abdominal margin blackish, with some patches of golden brown scales. Head and thorax golden brown marked with fuscous, collar blackish. Abdomen fuscous.

Expanse, 28 mm.

One example only of this curious species.

110. *Eusemia japana.*

Chelonomorpha japana, Motsch., Etud. Ent., 1860, p. 30.

Eusemia villicoides, Butl., Ann. & Mag. Nat. Hist. (4), xv., p. 141, pl. xiii., fig. 2 (1875).

Only one example; this differs from Japanese specimens in the smaller size of the cream-coloured spots on fore wings.

111. *Seudyra subflava*, Moore, Ann. & Mag. Nat. Hist., 1877, p. 85.

One specimen only.

112. *Retina costata*, Walk., Cat. Lep. Het., ii., 439, n. 2 (1854); Butl., Ill. Typ. Lep. Het., iii., p. 9, pl. xliii., fig. 7 (1879).

Five specimens. Walker notes the species from N. China.

113. *Eterusia œdea*, Clerck, Icon., pl. 4, fig. 2.

Seems common at Kiukiang, and exhibits but little disposition to vary.

114. *Soritia elizabetha*, Walk., Cat. Lep. Het., ii., 433.

One example only.

115. *Histia flabellicornis*, Fabr., Sp. Ins., ii., 163, 32; Walk., Cat. Lep. Het., ii., 412 (1854).

One example, smaller in size than Indian specimens, and with less blue on the wings.

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116. *Epicopeia mencia*, Moore, Proc. Zool. Soc., 1874, p. 578, pl. lxvii., fig. 8.

Two specimens, male and female.

117. *Arachotia hyalina*, n. s. (Pl. VII., fig. 6).

Male. Primaries black, with four hyaline spots before and six others beyond the middle. Secondaries hyaline with black borders, narrow on the abdominal fold, but broad on other margins; the border on outer margin projects inwardly as far as lower edge of discoidal cell. Fringes black, except at apices of all the wings, where they are white. Head and thorax bluish black, Abdomen greenish black, collar and segmental divisions marked with white. Antennæ deeply pectinated, steel-blue, whitish towards the tips, which are black. Under surface same as above, with the addition, on secondaries, of a small white dash on the anterior margin, and an oblong spot near the costa and beyond the middle. Legs black.

Expanse, 42 mm.

One very fine example.

118. *Phauda fortunii*, H.-S., Lep. Exot. Sp. Nov., Sér 1, fig. 223.

Phauda triadum, Walk., Cat. Lep. Het., i., 257.

Two examples.

119. *Syntomis muirheadii*, Feld., Wien., Ent. Mon., vi., 37.

An interesting series of specimens, showing some variation in the number and size of hyaline spots on secondaries and towards apex of primaries.

120. *Syntomis Pratti*, n. s. (Pl. IX., fig. 3).

Allied to *Syntomis muirheadii*, Feld., to which species it bears a strong superficial resemblance, but is separated therefrom by having only two hyaline spots towards base of primaries, and blackish margins to abdominal fold of secondaries. There is no yellow patch on the posterior edge of thorax, but one is situated band-like on first segment of abdomen, and this is followed by five yellow belts in the male and four in female. These last are interrupted on the back of the female by a stripe of the blackish ground colour. Antennæ strongly pectinated in the male, a character which at once distinguishes it from male *S. muirheadii*.

Expanse, ♂ 47 mm., ♀ 56 mm.

Two specimens, male and female.

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121. *Syntomis pascus*, n. s. (Pl. IX., fig. 1).

Closely allied to *Syntomis acrospila*, Feld., but wants the large white apical spot of that species; the hyaline spots of primaries are rather differently arranged, and that of the secondaries different in shape. Felder's figure* represents a male with five yellow belts on abdomen, but the male of *S. pascus* has six abdominal rings, and the female five.

Expanse, ♂ 45 mm., ♀ 52 mm.

Three specimens of each sex were received from Kiukiang.

122. *Syntomis thelebus*, Fabr.

Syntomis germana, Feld., Wein. Ent. Mon., vi., 37 (1862).

S. mandarinia, Butl., J. L. S., Zool., xii., 349.

In size of hyaline spots and confluency of abdominal bands this species varies greatly.

123. *Syntomis torquatus*, n. s. (Pl. IX., fig. 2).

In colour of wings, number, shape, and arrangement of hyaline spots this insect is not separable from *S. fortunii*, Boisd., but the yellow collar, five broad and two narrow abdominal bands, together with a small white patch in apical fringes of primaries, most clearly defined on under surface, at once show it to be distinct from that species.

Expanse, 34 mm.

One example.

124. *Alpenus flammeolus*, Moore, Ann. & Mag. Nat. Hist. (4), xx., 89.

A single example (female), which does not differ in the least from Japanese and Ningpo specimens.

125. *Rhodogastria lactinea*, Cram., Pap. Exot., ii., pl. cxxxiii., fig. D.

Rhodogastria sanguinolenta, Fab., Ent. Syst, iii., 473, 206.

One female of this variable species.

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* Reise de Novara, t. cii., fig. 11.

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126. *Dionychopus niveus*, Mén., Bull. Phys. Petersb., iii., 108.

One male, smaller than my Japanese examples.

127. *Rhyparicides rubescens*, Walk., Cat. Lep. Het., iii., p. 677.

Var. *amurensis*, Brem., Lep. Ost.-Sib., p. 39, tab. iii., fig. 16 (1864).

Appears to be pretty common at Kiukiang.

128. *Diacrisia subvaria*, Walk., Cat. Lep. Het., iii., p. 637, n. 2 (1855); Butl., Ill. Typ. Lep. Het., ii., p. 5, pl. xxiii., fig. 3 (1878).

Only one specimen from Kiukiang. I have a long series from Ningpo, taken by a native collector.

129. *Cystidia stratonice*, Cram., Pap. Exot., iv., 234, pl. 398, fig. K.

Vithora agrionides, Butl., Ann. & Mag. Nat. Hist. (4), xv., p. 137 (1875); Ill. Typ. Lep. Het., pt. ii., p. 3, pl. xxii., fig. 3.

Two examples taken in June.

130. *Hypercompa principalis*, Kollar, var. *regalis*. (Pl. IX., fig. 4).

Kiukiang specimens differ from the type in the much darker ground colour of primaries, and the spots on primaries and ground colour of secondaries are deep orange instead of pale yellow; the proportion of black in these last is also much greater, and the abdomen is heavily marked with black down the centre.

Among over a hundred specimens of *H. principalis*, which I took last year in the N.W. Himalayas, not one individual exhibited any trace of aberration in the direction of the Kiukiang form.

131. *Trypheromera plagifera*, Walk., Cat. Lep. Het., ii., p. 400 (1854).

Several specimens.

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132. *Bizone sanguinea*, Brem., Schmett. Nordl. China's, p. 14, tab. vi., fig. 4.

Five specimens.

133. *Bizone hamata*, Walk., Cat. Lep. Het., ii., p. 549.

Six specimens.

134. *Bizone phædra*, n. s. (Pl. IX., fig. 6).

Female. Primaries white, a band near the base united—on the costa, along the median nervure, and on the inner margin—to another placed before the middle of the wing; three black spots on the disk forming a triangle, and beyond these a broad angulated band; all these bands, together with one on the outer margin, which is deeply indented internally, are pale brick-red. Secondaries pale pinkish, with a fuscous discoidal spot. Fringes white. Under side pale pinkish, disk of primaries and central spot on secondaries fuscous. Head and thorax white, collar and tegulæ pinkish. Abdomen white, with some lateral tufts of pinkish scales.

Expanse, 46 mm.

Closely allied to *B. sanguinea*, Brem., but larger, and the markings are different. Only a female specimen was received from Kiukiang, but I have a male taken at Ningpo. The sexes are alike in colour and markings.

135. *Hypoprepia delineata*, Walk., Cat. Lep. Het., ii., p. 487 (1854).

Only one example.

136. *Digama abietis*, n. s. (Pl. IX., fig. 5).

Male. Primaries ashy grey, ornamented with black spots arranged in irregular transverse lines. Secondaries and abdomen pale orange. Head and thorax ashy grey, the latter spotted with black. Under surface of primaries and thorax sooty black; secondaries and abdomen as above. Legs sooty black.

Female rather larger, but in all other respects same as male.

Expanse, ♂ 26 mm., ♀ 34 mm.

This species is closely allied to *D. hearsayana*, Moore, but the colour of primaries is different, and the black spots are more numerous and larger; the abdomen is unspotted, and there is no discal spot on the under surface of secondaries.

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I have received but one example (male) from Kiukiang. In April, 1886, I found *D. abietis* in the Snowy Valley, near Ningpo, fairly plentiful at rest on the trunks of fir-trees, from which they darted quickly when approached. They flew wildly from tree to tree, and were difficult to capture.

137. *Eligma narcissus*, Cram., Pap. Exot., i., 116, pl. 73, figs. E, F.

One specimen.

138. *Lithosia vetusta*, Walk., Cat. Lep. Het., ii., p. 508 (1854).

Eight specimens, agreeing well with examples in my collection from Corea.

139. *Numenes disparilis*, Staud., Rom. Mem. sur les Lep., Tome iii., p. 200.

One female example.

140. *Laria l-nigrum*, Muller, Faun. Fr., p. 40.

Kiukiang specimens have the L or V mark on the upper surface of the primaries replaced by a small round dot, but agree in every other respect with the typical form.

141. *Porthetria dispar*, Linn.

Liparis dispar var. *japonica*, Motsch., Etud. Ent., 1860, p. 31.
Porthetria umbrosa, Butl., Trans. Ent. Soc. Lond., 1881, p. 10.
P. hadina, Butl., *l. c.*

Kiukiang specimens come between *hadina*, Butl., and *japonica*. Motsch., and these, together with *umbrosa*, are certainly forms of *P. dispar*. Seeing how subject to variation *P. dispar* is in Europe, it is perhaps not matter for surprise that the species should also vary in Asia, and that the Asian forms and those of Europe be connected by intermediates.

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142. *Leucoma salicis*, Linn.

Four specimens agreeing with the European form, only the wings appear to be more closely scaled, thus giving the insect a more silvery white but less glossy appearance.

143. *Belippa horrida*, Walk., Cat. Lep. Het., Suppl., ii., p. 509.

Only one specimen.

144. *Attacus cynthia*, Drury, App., ii., Cram., Pap. Exot., i., 62, pl. 39, fig. A.

Attacus pryeri, Butl., Proc. Zool. Soc., 1878, p. 387, n. 18; Ill. Typ. Lep. Het., pt. iii., p. 11, pl. xliii., fig. 5 (1879).

A. walkeri, Feld., Wien. Ent. Mon., vi., p. 34.

A large number of examples, which, from their splendid condition, appear to have been bred.

The specimens are for the most part of the Japanese form (*pryeri*, Butl.), but there are others which cannot be separated from *walkeri*, Feld. Neither of these forms appear to show specific differences from *cynthia*.

145. *Actias sinensis*, Walk., Cat. Lep. Het., vi., p. 1264 (1855).

One specimen.

146. *Actias selene*, Hübn., Verz. Schmett., 152, 1588.

Actias ningpoana, Feld.

Tropæa artemis, Brem.. Etud. Entom. de Motschulsky, p. 64 (1852); Lep. Ost.-Sib., p. 44, tab. ii., fig. 6 ♂, fig. 7 ♀.

T. gnoma, Butl., Ann. & Mag. Nat. Hist. (4), xx., p. 480 (1877); Ill. Typ. Lep. Het., pt. ii., p. 17, pl. xxv., fig. 1 (1878).

Four examples, three of which agree with the form *ningpoana*, and the other with the type.

147. *Antheræa pernyi*, Guerin, Rev. et Mag., Zool., 1855—6, 297, pl. vi., fig. 1.

Antheræa hazina, Butl., Trans. Ent. Soc. Lond., 1881, p. 13.

One female specimen only.

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147 *a*. *Saturnia pyretorum*, Boisduval MSS., Westw., Cab. Orient. Ent., 49, pl. 24, fig. 2.

One specimen bred by Pratt in March, 1888, from a pupa obtained at Kiukiang in 1887.

148. *Brahmæa undulata*, Brem., Schmett. Nordl. China's, p. 16, pl. v., fig. 3.

Five specimens of this fine species.

149. *Clisiocampa neustria*, Linn.

Two specimens, male and female, identical with European examples.

150. *Odonestis læta*, Walk., Cat. Lep. Het., vi., 1416, n. 6 (1855).

Three specimens, which appear to have been bred.

151. *Trabala vishnu*, Lef., Zool. Journ., iii., 207 (1827).

Var. *sulphurea*, Kollar, Kaschmir, Von Hugel, 171, 1.
Trabala basalis, Walk., Lep. Het., vii., 1785.

One specimen of the var. *sulphurea*.
The type has been recorded from Hongkong and Madras, and the variety from Silhet, Murree, and several places in N. India.

152. *Phassus sinensis*, Moore, Ann. & Mag. Nat. Hist. (4), xx., 94 (1877).

One specimen in very imperfect condition.

153. *Thyatira trimaculata*, Brem., Bull. Acad. Sci. St. Pet., iii., 570 (1861); Lep. Ost.-Sib., p. 47, tab. v., fig. 5.

One example.

154. *Acronycta rumicis*, Linn.

Two specimens darker than those from Europe, but agreeing in this respect with examples from the Corea and Japan.

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155. *Moma* (*Noctua*) *orion*, Esp., 108, 4—7; Tr., v., 1, 54; Dup., vi., 85, 5; Frr. B., 22; Guén., i., 36.

Noctua aprilina, Wien. Verz, 70, 6; Fabr., Mant. Ins., ii., 172, 247; Hübn., Eur. Schmett. Noct., pl. 5, fig. 22.

Diphtera orion, Walk., Cat. Lep. Het., ix., 33.

One example agreeing exactly with specimens from Europe.

156. *Mythimna turca*, Linn.

Two examples.

157. *Mythimna placida*, Butl., Ann. & Mag. Nat. Hist. (5), i., 79 (1878); Ill. Typ. Lep. Het., pt. ii., p. 21, pl. xxviii., fig. 5 (1878).

One specimen.

158. *Mythimna* (*Leucania*) *singularis*, Butl., Ann. & Mag. Nat. Hist. (5), i., 80 (1878); Ill. Typ. Lep. Het., pt. ii., p. 22, pl. xxviii., fig. 11.

Mythimna formosana, Butl., P. Z. S., 1880. p. 673.

Two specimens.

159. *Leucania decisissima*, Walk., Cat. Lep. Het., Suppl., ii., 624 (1865).

Leucania salebrosa, Butl., Ann. & Mag. Nat. Hist. (5), i., 80 (1878); Ill. Typ. Lep. Het., pt. ii., p. 22, pl. xxviii., fig. 10.

L. rufistrigosa, Moore, P. Z. S., 1881, p. 337.

Appears to be a very variable species.

160. *Leucania extranea*, Guen., Noct., i., 77, 104.

A long and exceedingly variable series. Some of the specimens appear to be identical with *L. trifolii* and *L. scacharivora*, both of Butler, and from Chili.

161. *Leucania simplex*, n. s.

Primaries pale brown, with a reddish tinge, the median nervure is but little, if any, paler, and there is no shade below it; a curved series of minute black dots seated on the nervules towards outer margin, and a dark oblique and rather indistinct streak from the

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apex to middle of wing are the only noticeable markings. Fringes rather darker. Secondaries fuscous, broadly pale along the anterior and inner margins; fringes pale brown. Head and thorax pale brown tinged with red; abdomen pale brown, shaded with fuscous. Under surface of primaries pale greyish brown, with lustrous reflections, and a small fuscous cloud on the disc; secondaries pale lustrous grey; all the wings have a series of small black points on their outer margins just before the fringes.

Expanse, 40 mm.

162. *Cloantha polyodon*, Clerck.

Cloantha perspicillaris, Linn.

C. orontii, Her.-Schäff., Schmett. Eur., ii., pl. 36, figs. 180, 181.

C. intermedia, Brem., Bull. de l'Acad., 1861, t. iii.; Lep. Ost.-Sib., p. 53, tab. v., fig. 13.

A fine series, showing much variation in depth of colour and intensity of marking.

163. *Mamestra thoracica*, Walk., Cat. Lep. Het., xv., p. 1684.

One example.

164. *Mamestra dolorosa*, Walk., Cat. Lep. Het., xxxii., p. 667.

Only one specimen.

165. *Perigea illecta*, Walk., Cat. Lep. Het., Suppl., ii., 684.

One example, and this appears very like one of the forms of *A. didyma*, Esp.

166. *Hadena funerea*, Hein., Schm. D., i., 828.

Xylophasia sodalis, Butl., Ann. & Mag. Nat. Hist. (5), i., p. 83, 1878; Ill. Typ. Lep. Het., ii., p. xxix., fig. 2.

Three specimens, agreeing with *H. funerea*, Hein., and also with some of the insects comprising a series in the National Collection, labelled *Xylophasia sodalis*, Butl.

167. *Caradrina cæca*, Oberth., Diagn. Lep. Ask., p. 14.

One example.

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168. *Hermonassa cecilia*, Butl., Ann. & Mag. Nat. Hist. (5), i., 164 (1878); Ill. Typ. Lep. Het., pt. iii., p. 14, pl. xliv., fig. 9 (1879).

Three specimens.

169. *Agrotis ypsilon*, Rott., Naturf., xi., p. 141.

Agrotis suffusa, Hübn., 134.

This appears to be a very common insect at Kiukiang. The series received includes most of the forms occurring in Europe.

170. *Graphiphora dahlii*, Hübn.

Graphiphora canescens, Butl., Ann. & Mag. Nat. Hist. (5), i., 165 (1878); Ill. Typ. Lep. Het., pt. ii., p. 28, pl. xxx., fig. 1.

Several specimens showing considerable variation in tone of colour. Among them are examples exactly identical with *canescens*, Butl.

171. *Graphiphora brunnea*, Fabr.

A short series.

172. *Graphiphora pacifica*, Butl., Ann. & Mag. Nat. Hist. (5), i., 165 (1878); Ill. Typ. Lep. Het., pt. ii., p. 28, pl. xxx., fig. 2 (1879).

One specimen.

173. *Aplectoides caligenea*, Butl., Trans. Ent. Soc. Lond., 1881, p. 185, n. 66.

One example.

174. *Polydesma vulgaris*, Butl., P. Z. S., 1886, p. 381.

One example.

175. *Eurois exclusa*, n. s. (Pl. IX., fig. 9).

Male. Primaries greyish, with a tinge of blue along the inner margin, and an ochreous shade over the disc; a short line at the base, and one before the middle running from outer to inner margins, blackish, the interspace slightly darker than ground colour, an interrupted and much dentated blackish line commencing on the middle of costa and terminating on inner margin near the

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blackish submarginal line; this last is edged externally with whitish, space between the two lines filled up with dark brown, and intersected from the costa to below median nerve by an angulated black line, a row of black dots, and a thin wavy black line along the outer margin; reniform stigma whitish, indistinctly outlined, from its external edge, which is bordered with black, a short black dash is projected in the direction of outer margin. Secondaries greyish brown, central line and outer margin darker. Fringes greyish, paler at their base. Head and thorax ashy grey, collar darker; abdomen greyish brown, darker on the last segments. Under surface of all the wings greyish brown, shaded with fuscous towards outer margins; discal spot and interrupted band-like central shade fuscous.

Expanse, 46 mm.

Two male specimens.

176. *Penicillaria geyeri*, Feld., Reise der Nov., t. cx., fig. 23.

Two examples, each differently coloured.

177, *Callopistria purpureofasciata*, Piller, t. 6, 2 (1783).

Callopistria pteridis, Fabr., Ent. Syst., 90 (1794).
C. exotica, Guen., Noct., ii., 294, 1097.
C. duplicans, Walk., Cat. Lep. Het., xii., p. 866, n. 14 (1857).

A variable series, among which are specimens exactly identical with examples from Europe and others which agree with *exotica*, Guen., and *duplicans*, Walk.

178. *Acontia bicolora*, n. s. (Pl. IX., figs. 7 ♂, 7 *a* ♀).

Male. Primaries: basal two-thirds canary-yellow, outer third reddish brown, with a broad lilacine fascia-like patch extending from the inner margin nearly to apex, parallel with outer margin; the boundary line separating the exterior portion from the basal is rather darker, and projects into the latter for a short distance just below the anterior margin. Fringes dark brown, with a patch of whitish at the apex. Secondaries dark brown, fringes whitish, intersected by a dark greyish line. Head and thorax canary-yellow; abdomen dark grey, segmental divisions paler. Under surface of all the wings fuscous, with a patch of yellow on the anterior margin of each wing near the apex, and an ill-defined yellow line

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on the outer margin of primaries; fringes of primaries dark brown, chequered at the apex and near outer angle with whitish; of secondaries whitish, intersected by a line of dark brownish.

Female. Primaries dark reddish brown, with two patches of canary-yellow along the anterior margin, and some yellow scales on the inner margin near the base and just below the middle of outer margin, a broad lilacine fascia as in the male, fringes dark brown, with some yellow scales at the apex and near the outer angle. Secondaries dark brown; fringes yellow, intersected by a darker line. Head and thorax blackish, irrorated with yellow. Under surface as in male.

Expanse, ♂ 24 mm., ♀ 21 mm.

One female example only from Kiukiang; the description and figure of male are from a Japanese specimen.

179. *Hecatera fasciata*, n. s. (Pl. IX., fig. 8).

Female. Primaries ashy grey, with a broad dark central fascia margined with whitish, similar in shape to the same character in *H. serena;* outer margin dark. Secondaries smoky. Head, thorax, and abdomen grey. Under surface dusky, with a darker band-like shade traversing each wing near their outer margin. A dark discal spot on secondaries.

Expanse, 32 mm.

Only one example (female) received.

180. *Dianthœcia compta*, Fabr., Mant., 169.

One example exactly like some European forms of this species.

181. *Plusia albostriata*, Brem. & Grey, Beitr. zur Schmett. Fauna des Nordl. Ch., 18, 97.

Three specimens.

182. *Plusiodonta compressipalpis*, Guen., Noct., 359, 1200.

Only one example.

183. *Gonitis mesogona*, Walk., Cat. Lep. Het., xiii., p. 1002.

Three specimens.

184. *Gonitis albitibia*, Walk., Cat. Lep. Het., xiii., p. 1001.

One example.

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185. *Amphipyra pyramidea*, Linn.

Amphipyra monolitha, Guen., Noct., ii., 414, 1279; Walk., Cat. Lep. Het., xiii., p. 1018 (1857).
A. magna, Walk., Cat. Lep. Het., Suppl., iii., p. 868 (1865).
Var. *obscura*, Oberth., Etud. Entom., v., p. 85.

Two specimens only from Kiukiang, one of which is the var. *obscura* and the other *magna*, Walk.

In a long and variable series of this species, taken by myself in Japan, there are specimens which agree with *monolitha*, Guen. Others with *magna* and one or two examples with Oberthür's variety. These forms are connected one with the other and with *pyramidea* by intermediates.

186. *Amphipyra livida*, Fabr., Mant., 138.

Amphipyra corvina, Motsch., Bull. Soc. Mosc., xxxix., i., p. 194.

A good series, mostly in fine condition.

187. *Nænia contaminata.*

Graphiphora contaminata, Walk., Cat. Lep. Het., Suppl., iii., p. 710 (1865).

Several specimens.

188. *Mormo mucivirens*, Butl., Ann. & Mag. Nat. Hist. (5), i., 289; Ill. Typ. Lep. Het., pt. ii., p. 37, pl. xxxii., fig. 5.

Several specimens. The Kiukiang form of this species is something paler in colour, and is without the dark central shade on fore wings so conspicuously defined in Japanese specimens.

189. *Orthogonia sera*, Feld., Wien. Ent. Mon., vi., 38.

Orthogonia crispina, Butl., Ann. & Mag. Nat. Hist. (5), i., 288 (1878); Ill. Typ. Lep. Het., pt. ii., p. 36, pl. xxxii., fig. 6.

A long and variable series, among which are examples of *crispina*, Butl., with "paler whity-brown tint and darker central band" on primaries.

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190. *Dichonia bipunctata*, Motsch., Etud. Ent., 1860, p. 32.

Appears to be fairly common at Kiukiang.

191. *Toxocampa lilacina*, Butl., Ann. & Mag. Nat. Hist. (5), i., 289 (1878); Ill. Typ. Lep. Het., ii., p. 37, pl. xxxii., fig. 8.

Toxocampa recta, Brem.

Four or five specimens. This is probably only a form of *T. viciæ*, Hübn.

192. *Calpe excavata*, Butl., Ann. & Mag. Nat. Hist. (5), i., 202; Ill. Typ. Lep. Het., pt. ii., p. 35, pl. xxxii., fig. 1.

One specimen.

193. *Lacera procellosa*, Butl., Ann. & Mag. Nat. Hist. (5), iv., 369 (1879).

One example.

194. *Sypna achatina*, Butl., Cist. Ent., ii., p. 245 (1877); Ill. Typ. Lep. Het., pl. xlvii., fig. 7.

Two examples.

195. *Sypna astrigera*, Butl., Cist. Ent. iii., p. 135.

One specimen only.

196. *Sypna distincta*, n. s. (Pl. IX., fig. 10).

Allied to *picta*, from which, however, it may be distinguished by its pale brown ground colour, and the very different markings on primaries. These consist of a short white basal line, double on the costa, but broken up into dots and turned in to the base below the median nervure; beyond this an almost straight line formed of white dots and irregular-shaped marks, reaching from anterior to inner margins, and at about the middle of the wing is another line of larger white spots or marks; this last starts from the costa, almost immediately turns in the direction of outer margin, then towards inner margin, and finally, after curving inwards again, falls straight on the inner margin directly under its point of origin. A central line of dark brown from the inner margin, but not reaching the costa, and beyond on the outer third is a broad

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stripe of dark brown, intersected by a wavy line of the ground colour. Reniform stigma represented by a large round white spot, preceded by three and followed by two smaller ones. Orbicular white dot-like, and outlined with dark brown. A row of white dots edged internally with blackish on the hind margin. Secondaries paler. A central wavy and angulated line from middle of anterior margin, terminating in a small white dash at the anal angle; two ill-defined dark lines parallel with hind margin, and a series of white linear dots, ringed with dark brown at the base of the pale brown fringes. Under surface pale grey; apices, basal half of primaries, and whole of secondaries irrorated with fuscous. Outer third of primaries, except at apex and anal angle, fuscous; the transverse discal lines of the same shade. Secondaries with a pale central space outlined with fuscous, and the ill-defined lines and hind marginal band also fuscous. Head and thorax colour of fore wings; abdomen colour of hind wings, but with darker dorsal tufts.

Expanse, 54 mm.

Ten examples of this species were received, all of which are males. There are some slight differences in the size, shape, and intensity of the white markings, but on the whole the species appears to be fairly constant.

197. *Ophideres tyrannus*, Guen., Noct., iii., 110, 1476.

Three specimens, two of which have olive-brown and the other reddish-brown fore wings.

198. *Ophideres fullonica*, Linn.

Two specimens with brown fore wings, tinged and spotted with green, but without white markings.

199. *Ophideres salaminia*, Cram., Pap. Exot., ii., 117, pl. 174, fig. A.

Only one example.

200. *Lagoptera dotata*, Fabr.

Appears to be common at Kiukiang.

201. *Lagoptera elegans*, Van der Hoven, Lep. Nov., pl. v., fig. 6, *a*, *b*.

A long and most variable series of this interesting species.

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202. *Catocala esther*, Butl., Cist. Ent., ii., p. 243 (1877); Ill. Typ. Lep. Het., pt. ii., p. 40, pl. xxxiii., fig. 9 (1878).

Catocala numœgeni, Staud.

Three specimens differing somewhat in colour.

203. *Catocala volcanica*, Butl., Cist. Ent., ii., p. 244, (1877); Ill. Typ. Lep. Het., pt. ii., p. 40, pl. xxxiii., fig. 10 (1878).

Five examples.

204. *Chrysorithrum amatum* (Brem., Ménétriés, Cat. Lep. Mus. Petrop., iii., pl. xvii., fig. 4).

One specimen.

205. *Patula macrops*, Linn.

Patula boopis, Guen., Noct., iii., 178, 1569.

An example of each sex.

206. *Nyctipao crepuscularis*, Linn.

Three examples.

207. *Spiramia retorta*, ♀, Linn. Mus. Lud. Ulr., ii.; Cram., Pap. Exot., iii., 146, pl. 274, fig. A.

Spiramia retorta, ♂, Cram., Pap. Exot., ii., 29, pl. 116, fig. F; *suffumosa*, Guen., Noct., iii., 195, 1590.
S. spiralis, Fabr., Sp. Ins., ii., 211, 10.
S. japonica, Guen., Noct., iii., 195, 1591.
S. jinchuena, Butl., Ann. & Mag. Nat. Hist. (5), xi., p. 115, n. 28.
S. inæqualis, Butl., *l. c.*, n. 29.

A fine series, comprising all the named forms enumerated above.

208. *Spiramia martha*, Butl., Ann. & Mag. Nat. Hist. (5), i., p. 292 (1878); Ill. Typ. Lep. Het., pt. ii., p. 41, pl. xxxiv., fig. 3.

Spiramia agrota, Butl., Trans. Ent. Soc. Lond., 1881, p. 197, n. 86.

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Several specimens, including both named forms of this insect, and the intermediates connecting one with the other.

Mr. Butler (*l. c.*), in his comparative description of *Spiramia agrota*, says that it is paler, and has less pronounced markings than *S. martha;* also that the first and second lines are nearer together, and the third hardly represented. In the series from Kiukiang are examples much darker, and with more strongly-defined markings than type of *S. martha*, whilst other specimens are much less clearly marked than the type of *S. agrota*.

Altogether this appears to be a most variable insect as regards colour and ornamentation of both the upper and under surfaces.

209. *Calliodes rectifasciata*, Henety.

Spiramia interlineata, Butl., Ann. & Mag. Nat. Hist. (5), i., 291 (1878); Ill. Typ. Lep. Het., ii., p. 41, pl. xxxiv., fig. 2.

A variable series.

210. *Cocytodes modesta*, Van der Hoven, Lep. Nouv., pl. vii., fig. 8.

Four examples.

211. *Ophiusa falcata*, Moore, Descr. Ind. Lep. Atk., ii., p. 171, pl. vi., fig. 14.

A fine series.

212. *Ophiusa algira*, Linn.

Ophiusa stuposa, Fabr.. Ent. Syst., iii., 2, 42, 112.

One example.

213. *Ophiusa arctotænia*, Guen., Noct., iii., 272, 1711; Walk., Cat. Lep. Het., xiv., p. 1431.

Five specimens showing some difference in width of central fascia on fore wings.

214. *Grammodes mygdon*, Cram., Pap. Exot., ii., pl. 156, fig. G.

One fine example.

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215. *Remigia archesia*, Cram., Pap. Exot., iii., 145, pl. 273, figs. F, G.

Remigia virbia, Cram., *l. c.*, fig. H.

A fine series, exhibiting some interesting variation.

216. *Remigia annetta*, Butl., Ann. & Mag. Nat. Hist. (5), i., 293 (1878); Ill. Typ. Lep. Het., pt. ii., p. 43, pl. xxxiv., fig. 7.

Four examples.

217. *Sonagara vialis*, Moore, P. Z. S., 1883, p. 27, pl. vi., fig. 9.

One specimen.

218. *Ophiodes triphænoides*, Walk., Cat. Lep. Het., xiv., 1358 (1858).

Ophiodes cuprea, Moore, P. Z. S., 1867, p. 74.

Eight specimens, differing somewhat in colour and strength of marking.

219. *Ophiodes tirrhæa*, Cram., Pap. Exot., ii., 15, pl. 172, fig. E.

Ophiodes vesta, Esp., Schmett., iv., pl. 141, fig. 1.
O. olivacea, Vill., Ent. Linn., 334, pl. 5.
O. auricularis, Hübn., Noct., pl. 66, fig. 321.
O. hottentota, Guen., Noct., iii., 229, 1635.
O. separans, Walk., Cat. Lep. Het., xiv., 1357.

A long series. Variable in shade of fore wing, ground colour, and in the width of black band on hind wing.

220. *Serrodes campana*, Guen., Noct., iii., 252, 1673.

Five specimens, exhibiting much variation in the character of basal markings on fore wing.

221. *Ophisma gravata*, Guen., Noct., iii., 237, 1648.

One male specimen.

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222. *Potamophora manlia*, Cram., Pap. Exot., i., 144, pl. 92, fig. A.

Several specimens, varying considerably in the intensity of the markings on fore wings. In one example only the reniform and orbicular stigmata are visible, and these are but faintly indicated.

223. *Hulodes caranea*, Cram., Pap. Exot., iii., 140, pl. 269, figs. E, F.

Only one example.

224. *Urapteryx delectans*, Butl., Ill. Typ. Lep. Het., pt. ii., p. 45, pl. xxxv., fig. 2 (1878).

One example of this species, which appears to be closely allied to *U. prætoraria*, Feld.

225. *Odontoptera mandarinata*, n. s. (Pl. IX., fig. 13).

Female. All wings dingy green (probably faded), each with a large dark brown discal spot surrounded with whitish, a narrow dark line on their outer margin; a few dark scales scattered over the upper third of secondaries. Fringes greyish brown, darker at the extremities of nervules. Under surface fuscous, with a few yellowish scales along anterior margin of primaries.

Expanse, 43 mm.

Except that the outer angle emargination of secondaries is slightly different, the female example from Kiukiang, described above, is identical with an unnamed male specimen from N. India in the National Collection at South Kensington. The difference referred to may be sexual. The species is also closely allied to *O. chalybeata*, Moore, which, however, has distinct transverse bands on the dark yellow under surface.

226. *Geometra viridiluteata*, Walk., Cat. Lep. Het., xxii., p. 515 (1861).

One male example.

227. *Thalera strigata*, Muel., Faun., Ins. Fr., p. 51 (1764).

Thalera (*Hemithea*) *thymiaria*, Guen., Phal., i., 384.

One female specimen.

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228. *Thalera crenulata*, Butl., Ann. & Mag. Nat. Hist. (5), i., 399 (1878); Ill. Typ. Lep. Het., pt. iii., p. 37, pl. l., fig. 2.

One specimen.

229. *Ephyra grata*, Butl., Ann. & Mag. Nat. Hist. 1879, p. 438.

Two specimens.

230. *Bizia æxaria*, Walk., Cat. Lep. Het., xx., 261 (1860); Butl., Ill. Typ. Lep. Het., iii., p. 31, pl. xlviii., fig. 5 (1879).

Eudropia milbuaria, Felder, Reise der Nov., Lep., v., t. cxxiii., fig. 31 (1875).

Three specimens, differing considerably in size.

231. *Elphos latiferaria*, Walk., Lep. Het., xxi., p. 445 (1860); Butl., Ill. Typ. Lep. Het., pt. iii., pl. xlix., fig. 11.

Three specimens, varying somewhat in size, colour, and intensity of marking.

232. *Boarmia picata*, Butl., Trans. Ent. Soc. Lond., 1881, p. 408, n. 104.

Five specimens. This appears to be a form of *B. repandata*, Linn., of which species I have seen British examples that agree exactly with these from Kiukiang.

233. *Boarmia consortaria*, Fabr.

Boarmia conferenda, Butl., Ann. & Mag. Nat. Hist. (5), i., 395 (1878).

Three specimens.

234. *Boarmia grisea*, Butl., Ann. & Mag. Nat. Hist. (5), i., 396 (1878); Ill. Typ. Lep. Het., pt. iii., p. 33, pl. xlix., fig. 2.

One male example.

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235. *Boarmia ocellata*, n. s. (Pl. IX., fig. 11).

Male. All the wings whitish, sprinkled with brown and ochreous scales, clouded with fuscous at the tips and angles, and with a series of black points on edge of outer margins. Discal rings blackish, conspicuous. Primaries: anterior margin narrowly edged with dark brown, and with three dark brown marks, from which emanate three transverse angulated lines; only one, however—that beyond the middle—is distinctly traceable; submarginal line pale. Secondaries: central line blackish, serrated, and curved; submarginal line ill-defined, represented at the extremities by a darkish shade edged externally with whitish. Fringes greyish. Head, thorax, and abdomen colour of wings. Antennæ deeply pectinated almost to their tips. Under surface whitish, with large black discal spots, and broad black hind marginal bands interrupted in the middle.

Female. Colour and markings as in male. Antennæ slightly serrated.

Expanse, ♂ 57—60 mm., ♀ 57 mm.

Very nearly allied to *Boarmia selenaria*, Hübn.; in the male of that species, however, the antennæ are not pectinated, but slightly setose only along their outer edge, and the female has filiform antennæ: therefore the two species are readily separated by these characters alone without reference to the wing-ornamentation, which, though much alike in the two species, present differences, such as the conspicuous discal rings above and spots below of *B. ocellata*. These, together with the black hind marginal band on under surface, at once distinguish this species from *B. selenaria*, or any other known Boarmid.

Three examples (one male, two females).

236. *Stenotrachelys cinerea*, Butl., Trans. Ent. Soc., Lond., 1881, 409.

Two specimens.

237. *Buzura abraxata*, n. s. (Pl. IX., fig. 14).

Female. Primaries white, with some yellow and brownish markings at the base, the most distinct of which are a yellow curved line from costa to inner margin, edged internally as far as the median nervure and externally to the submedian nervure with brownish; submarginal line yellow, edged externally with brownish.

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and bordered on each side with fuscous. There are several fuscous spots, including a large central one, scattered over the disc, and a band of the same colour tapering towards the inner angle traverses the outer margin. Secondaries white, with a large central fuscous spot and some smaller ones on all the margins; a yellow line, edged with brownish and bordered with fuscous, runs from anal angle parallel with outer margin as far as the third median nervule. Antennæ brown, slightly serrated. Head and pectus yellowish, collar white, tipped with yellowish brown. Thorax white, ornamented with yellow and brownish. Abdomen white, tinged with fuscous dorsally; tufts yellowish. Fringes grey, partly chequered with white. Under surface: colour, and markings very similar to those of the upper side, but the central spots are yellowish brown.

Expanse, 78 mm.

238. *Pachyodes arenaria*, n. s. (Pl. IX., fig. 12).

Female. All the wings whitish. Primaries with some fuscous and brownish scales, sparingly sprinkled over the disc, more thickly on the costa and towards outer margin, and forming a dark patch on the anterior margin before the apex; before the middle is a brownish curved transverse line, preceded by a small oval mark and followed by a much larger one, both outlined in dark brown, and filled up with paler; beyond the middle a curved dark brown line from the costa appears to terminate at the second median nervule, but may be faintly traced from this point curving in the opposite direction to the inner margin. Secondaries whitish, sprinkled with pale brownish scales; submarginal line pale and ill-defined. Under side whitish. Primaries with a round spot above, a short bar near the base succeeded by a large oval spot, and a narrow curved fascia, all dark brown in colour, and, excepting the short bar, are reproduced on the secondaries. Head and collar brownish, thorax and abdomen whitish.

Expanse, 59 mm.

239. *Rhyparia jaguaria*, Guen., Phal., ii., 198, 1246.

Several fine examples. They are paler and larger than specimens from Japan.

240. *Abraxas sylvata*, Scop., Ent. Carn., p. 220 (1763).

Abraxas ulmata, Fabr., Syst. Ent., 632.

A. miranda, Butl., Ann. & Mag. Nat. Hist. (5), i., p. 441 (1878); Ill. Typ. Lep. Het., pt. iii., p. 48, pl. lii., fig. 12.

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An extensive series, including specimens exactly identical with *miranda*, Butl., and typical examples of *sylvata*, with aberrations of the latter form leading up to *miranda*.

241. *Abraxas martaria*, Guen., Phal., ii., 205, 1258.

Three specimens.

242. *Abraxas junctilineata*, Walk., Cat. Lep. Het., xxiv., p. 1123, n. 18 (1862); Butl., Ill. Typ. Lep. Het., pt. ii., p. 53, pl. xxxvii., fig. 5 (1878).

One example, agreeing exactly with specimens from Japan.

243. *Abraxas amplificata*, Walk., Cat. Lep. Het., xxiv., p. 1124 (1862).

Four specimens, varying in size.

243*a*. *Abraxas interruptaria*, Feld., Wien. Ent. Mon., 1862, p. 39; Reise der Nov., pl. cxxix., fig. 29.

Varies in the size and intensity of black markings; in one example these are confluent, the white ground colour forming six spots on the primaries, and on secondaries is shown as a spot and fascia at the base, a central and two submarginal dashes.

244. *Panæthia hemionata*, Guen., Phal., ii., 208, 1267.

Only one example.

245. *Obeida vagipardata*, Walk., Cat. Lep. Het., xxiv., p. 1139 (1862).

Appears to be common at Kiukiang. The specimens differ greatly in the size of black spots; especially is this the case on the secondaries, where the spots are often confluent, and form wide bands.

246. *Aspilates mundataria*, Cram., Pap. Exot., 400, H.

Aspilates tonghata, Feld., Reise der Nov., t. cxxix., fig. 12.

One example.

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247. *Percnia foraria*, Guen., Phal., ii., 217, 1280.

A fine series.

248. *Acidalia strigilaria*, Hübn.

Acidalia vagata, Walk., Cat. Lep. Het., xxiii., 762.

Four specimens, differing from European examples only in colour. The Kiukiang form is *vagata*, Walk., but is pale brown instead of grey.

249. *Acidalia indicataria.*

Argyris indicataria, Walk., Cat. Lep. Het., xxiii., p. 809 (1861); Butl., Ill. Typ. Lep. Het., iii., p. 43, pl. li., fig. 8 (1879).

Only one example. This insect appears to have nothing whatever to do with the genus *Argyris*, Walk.

250. *Asthena superior*, Butl., Ann. & Mag. Nat. Hist. (5), i., p. 400 (1878); Ill. Typ. Lep. Het., iii., p. 39, pl. l., fig. 9 (1879).

Three specimens.

251. *Timandra amataria*, Linn.

Timandra comptaria, Walk., Cat. Lep. Het., xxvi., 1615 (1862); Butl., Ill. Typ. Lep. Het., pt. iii., p. 41, pl. li., fig. 2.

252. *Macaria zachera*, Butl. Ann. & Mag. Nat. Hist. (5), i., p. 405 (1878): Ill. Typ. Lep. Het., iii., p. 45, pl. lii., fig. 2 (1879).

Several specimens.

253. *Macaria sinicaria*, Walk., Cat. Lep. Het., xxvi.

Macaria proditaria, Brem., Lep. Ost.-Sib., p. 81, t. vii., fig. 7 (1864).

M. maligna, Butl., Ann. & Mag. Nat. Hist. (5), i., 405 (1878); Ill. Typ. Lep. Het., iii., 45, pl. lii., fig. 3 (1879).

Four specimens, differing in size.

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254. *Carige duplicaria*, Walk., Cat. Lep. Het., xxvi., 1632 (1862).

Macaria nigronotaria, Brem., Lep. Ost.-Sib., p. 80, t. vii., fig. 6 (1864).

One example.

255. *Melanippe procellata*, Hübn.

Melanippe inquinata, Butl., Ann. & Mag. Nat. Hist. (5), i., p. 448 (1878); Ill. Typ. Lep. Het., pt. iii., p. 54, pl. liv., fig. 9.

I have but one specimen from Kiukiang, and this agrees exactly with Butler's figure of *M. inquinata*. Among a most variable series of *M. procellata*, which I obtained in Japan, are specimens identical with that from Kiukiang and others in no way different from European forms of the species, whilst of the remainder several are exceedingly dark in coloration.

256. *Melanippe* (?) *undulata*, n. s. (Pl. IX., fig. 15).

Male. Primaries with a black discal spot surrounded with whitish; basal patch, central fascia, and hind marginal band black, separated from each other by pure white angulated lines, and intersected by less distinct wavy whitish lines. A series of white spots, of which that at the apex is the largest along the outer margin. Secondaries black with whitish spots; angulated and wavy whitish lines as on primaries. Under surface of all wings similar to above, but with broader lines of white. Head, thorax, and abdomen black, the latter with whitish rings.

Expanse, 35 mm.

Only one example of each sex.

257. *Micronia pontiata*, Guen., Phal., ii., 29, 938; Walk., Cat. Lep. Het., xxiii., 819.

One example.

258. *Cidaria mactata*, Feld., Reise der Nov., t. cxxxii., fig. 40.

Several specimens, varying in size.

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Explanation of Plates VII., VIII., & IX.

PLATE VII.

Fig. 1. *Papilio elwesi:* 1 *a*, neuration of hind wing.
2. „ *sarpedon*, Linn., var.
3. *Lycæna moorei.*
4. *Thecla pratti.*
5. *Sciapteron chinense.*
6. *Aracotia hyalina.*
7. *Hypothyris aperta.*

PLATE VIII.

1. *Athyma fortuna*, ♂; 1 *a*, *A. fortuna*, ♀.
2. *Mycalesis regalis*, ♂; 2 *a*, *M. regalis*, ♀.
3. *Lethe naias.*
4. „ *butleri.*
5, 5 *a*. *Melanargia halimede* var. *meridionalis*, Feld.

PLATE IX.

1. *Syntomis pascus.*
2. „ *torquatus.*
3. „ *pratti.*
4. *Hypercompa principalis* var. *regalis.*
5. *Digama abietis.*
6. *Bisone phædra.*
7. *Acontia bicolora*, ♂; 7 *a*, *A. bicolora*, ♀.
8. *Hecatera fasciata.*
9. *Eurois exclusa.*
10. *Sypna distincta.*
11. *Boarmia ocellata.*
12. *Pachyodes arenaria.*
13. *Odontoptera mandarinata.*
14. *Buzura abraxata.*
15. *Melanippe? undulata.*

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VI. *A Monograph of British* Braconidæ. Part III.

By the Rev. T. A. Marshall, M.A., F.E.S.

[Read December 5th, 1888.]

Plates X. & XI.

XVI. CALYPTIDES.

Abdomen sessile. Fore wings with 2 cubital areolets, the 1st separated from the prædiscoidal; recurrent nervure rejected; radial areolet lanceolate, not reaching the apex of the wing; prædiscoidal areolet petiolated; axillary areolet closed by an oblique transverse nervure. Terebra elongate.

The two genera here brought together by authors are so different in appearance that their association seems hardly natural; the structure of their abdomen varies in some important respects. They agree, however, in the combination of a sessile abdomen with 2 cubital areolets, characters not found united in any other subfamily except the *Blacides* and *Liophronides*. These two have the axillary areolet of the fore wing open; in the *Calyptides* the same areolet is closed. On the other hand, the *Calyptides* have the podiscoidal areolet of the fore wing closed, while it is half open in the *Blacides* and *Liophronides*.

Abdomen showing 8 segments above; the 1st much longer than broad .. .. i. Eubadizon.
Abdomen seldom showing more than 3 or 4 segments above, the rest more or less retracted; the 1st not or hardly longer than its apical breadth .. .. ii. Calyptus.

i. Eubadizon, *Nees.*

Eubazus, Nees, Act. Ac. L. C., 1819, p. 307.
Eubadizon, Sectio I., Nees, Mon., i., 233; Hal., Ent. Mag., iii., 131; Wesm., Nouv. Mém. Ac. Brux., 1835, p. 164; S. v. Voll., Schets., ii., Braconiden, tab. iv.
Charmon, Hal., Ent. Mag., i., 262.

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Elongate, slender. Labial palpi tri- or subquadriarticulate. Abdomen linear, with 8 visible segments; suturiform articulation obsolete in the middle; 1st segment striolated, much longer than broad, slightly attenuated at the base; tubercles situated before the middle. Legs long and slender. Terebra elongate.

Head transverse, broader than the thorax; clypeus separated from the face by a curved impression, deeper at the sides, with 2 basal foveæ; mandibles bidentate; antennæ slender, setaceous, elongate, or, if shorter, subincrassated towards the apex; maxillary palpi 6-jointed. Abdomen with segments 1—3 elongate, the others very short; 1st segment, and sometimes the base of the 2d, striolated, the rest smooth; sutures visible (except the middle of the suturiform articulation); belly of the ♀ compressed, carinated.

The species are few in number, and only the first is of common occurrence; Nees von Esenbeck described 5, in two sections, the latter of which comprised only *E. trigonus*, with 3 cubital areolets, now transferred to the genus *Microtypus*, Ratz.; his first species, *E. macrocephalus*, belongs apparently to the next genus. Wesmael and Haliday each added a new species, and another, *E. rufipes*, is figured by Herrich-Schäffer in Panz. F. G., 154, 24.

These insects, so far as known, are parasites of Lepidoptera.

Table of Species.

(4) 1. Second abdominal segment smooth.

(3) 2. Scutellum and pectus more or less rufous; antennæ ♀ longer than the body, slender, setaceous, more than 40-jointed .. .. 1. *extensor*, L.

(2) 3. Scutellum and pectus black; antennæ ♀ shorter than the body, incrassated towards the apex, 22-jointed .. .. 3. *flavipes*, Hal.

(1) 4. Second abdominal segment rimulose .. .. 2. *pallidipes*, Nees.

1. *Eubadizon extensor*, L.

Ichneumon extensor, L., Fn. Suec., 1613; S. N., 935; *Pimpla extensor*, Fab., Piez., 115, ♀.

Eubadizon pectoralis, Nees, Mon., i., 236; Hal., Ent. Mag., iii., 132, ♀; Wesm., Nouv. Mém. Ac. Brux., 1835, p. 165, ♂ ♀; Ratz., Ichn. d. Forst., ii., pl. ii., f. 30.

Black; palpi and legs flavo-testaceous; mandibles, pectus, pleuræ, scutellum, often the prothorax, disk of the mesothorax

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partly, and sides of the metathorax, rufo-testaceous. Wings hyaline; squamulæ, costa, and stigma yellow; nervures pale fuscous. First abdominal segment rimulose. Terebra as long as the body, or hardly shorter. ♂ ♀. Length, 2¼—3; wings, 4½—6 lin.

Var. 1, ♀. Scutellum black. Wesmael.

Var. 2. Thorax mostly rufous; antennæ rufous at the base. Haliday.

Antennæ ♀ longer than the body, very slender, setaceous, 42—46-jointed, testaceo-fuscous, the 1st joint and apex of the 2d paler; those of the ♂ one-half longer than the body (broken in my specimen); mandibles rufous, sometimes blackish, acutely bidentate; maxillary palpi very long, joints 1, 2, short, 4 longest. Thorax attenuated at both ends; mesothoracic sutures impunctate; metathorax shining, with a medial oblong punctulate fovea, having raised edges. Stigma ovate-lanceolate; radial areolet acuminate, not quite reaching the apex of the wing; radius sinuated; recurrent nervure far rejected; pobrachial areolet of the hind wings ⅔ of the length of the præbrachial; axillary transverse nervure distinct. Abdomen longer than the head and thorax, and narrower than the latter; 1st segment less than ⅓ of its entire length, linear, rimulose or sublævigated, with prominent tubercles near the base; the other segments smooth and shining; suturiform articulation indistinct; segments 2—3 together as long as all the following. Terebra rufous, with black pilose valves. ♂ similar, but the antennæ and posterior abdominal segments are longer.

The Linnean *Ichneumon extensor* was supposed by Gravenhorst to be *Pimpla roborator*, Fab., but the type-specimen having now been verified by Fitch, the name is restored to the present insect. Described from 1 male, 7 females taken in Darenth Wood, and Devonshire; found by Bignell at Ivybridge; in Ireland, not uncommonly, by Haliday; and generally distributed in northern and central Europe. First taken, according to Nees, in the Sudetsch mountains of Bohemia; Ratzeburg's specimens were reared by Nördlinger at Grand Jouan in the beginning of June from *Sericoris Nördlingeriana*, Ratz., and *Coccyx? Mulsantiana*, Ratz.; by Brischke and others from *Tortrix rosana* and *viridana*, L.; *cratægana* and *diversana*, Hüb.; *Phlæodes immundana*, Fisch.; and in England by Colquhoun out of *Depressaria nervosa*, Haw.

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2. *Eubadizon pallidipes*, Nees.

Eubazus pallipes, Nees, Mag. Ges. Berl., 1814, p. 215, ♀.

Eubadizon pallipes, Nees, Mon., i., 235, ♂ ♀; Wesm., Nouv. Mém. Ac. Brux., 1835, p. 167, ♀.

E. coxalis, Nees, Mon., i., 235, ♂.

E. semistriatus, Hal., Ent. Mag., iii., 131, ♂ ♀.

Black; mouth, palpi, antennæ at the base, and legs, testaceous; hind tibiæ margined at the apex with fuscous, their tarsi almost entirely fuscous. Wings hyaline; squamulæ rufous; stigma and nervures fuscous. First and second abdominal segments rimulose. Terebra one-half longer than the body. ♂ ♀. Length, 1¾—2 lin.

Antennæ ♀ (broken); 1st joint beneath and apex of the 2d testaceous. Mandibles testaceous in the middle. Metathorax rugose, carinated at the base, with prominent posterior angles. Wings less ample than those of *extensor*, and distinguished by the dark stigma. Legs shorter and stouter. First abdominal segment rimulose, dull, deeply excavated near the base, and with prominent tubercles; from the middle to the apex faintly canaliculated; 2d segment also rimulose and dull, the following segments smooth and shining. Wesmael.

♂. Antennæ slender, not much longer than the body, 28-jointed, joints 1—2 testaceous beneath; mandibles small, nearly concealed, flavo-testaceous. Mesothoracic sutures punctulate. Metathorax thickly punctate. Radial areolet acuminate; pobrachial areolet of the hind wings ⅔ the length of the præbrachial. Abdomen hardly narrower than the thorax, linear, depressed; 1st segment occupying ¼ of its length, ½ longer than broad; tubercles situated before the middle; 2d segment shorter, rimulose, the lateral margins narrowly lævigated; the following segments successively decreasing in length, smooth, with inconspicuous sutures; segments 2—3 together somewhat longer than all the following; anal forceps protruded, large, conchiform. Haliday.

Described by Haliday from a specimen in the collection of Curtis; he had not seen the ♀, nor Wesmael the ♂; I have never met with the species.

3. *Eubadizon flavipes*, Hal.

Eubadizon flavipes, Hal., Ent. Mag., iii., 132, ♂ ♀.

Black, shining; legs flavo-testaceous; 1st abdominal segment

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bicarinated, the rest very smooth. Terebra longer than the body. ♂ ♀. Length, 1¼—1¾; wings, 2¼—3 lin.

Formed like *extensor*, but the antennæ, legs, and abdomen are shorter. ♀. Antennæ shorter than the body, filiform, 21-jointed, the last joint enlarged, oblong. Palpi much shorter than those of *extensor*. Mesothoracic sutures impunctate. Metathorax areated, vaguely punctulate. Wings hyaline; stigma fuscous; radix and squamulæ pale ferruginous; pobrachial areolet of the hind wings hardly as long as ⅔ of the præbrachial. Hind tibiæ at the apex, and their tarsi almost entirely, fuscescent. Abdomen narrower and scarcely longer than the thorax; 1st segment occupying more than ⅓ of its entire length; tubercles minute, situated between the base and the middle; on the disk are two acutely elevated carinæ, approximated posteriorly, the interstices hardly striolated; the remaining segments very smooth; 2d and 3d hardly discrete, together as long as the 1st; the following segments very short; belly carinated, pale, pellucid. Terebra slender, less than half as long again as the body. ♂. Antennæ 24—25-jointed, somewhat longer than the body.

Inhabits north Ireland, but rarely. Haliday. An English ♀ specimen is in Fitch's collection, having the antennæ 22-jointed, and somewhat incrassated towards the tips; it presents some other characters not noticed by Haliday; 1st abdominal segment piceous, its extreme base testaceous; hind coxæ above, and a line on the 4 posterior femora, piceous; hind tibiæ broadly fuscous at the apex; nervures, especially of the hind wings, decolorous and hard to be seen. I cannot consider it anything more than a variety of *flavipes*.

Obs. There is an obscure reference in Ratzeburg (Ichn. d. Forst., ii., 65) to a parasite bred by Reissig from *Cryptorrhynchus lapathi*, L., and which was never properly examined. It resembled a *Macrocentrus*, but had only 2 cubital areolets—the neuration of a *Brachistes*. This is immediately suggestive of *Eubadizon flavipes*, and of nothing else. "A hint," says Ratzeburg, "for future breeders."

ii. Calyptus, *Haliday*.

Hal., Ent. Mag., iii., 128 (1835); S. v. Voll., Schets., ii., Braconiden, tab. iv. (wing).

Brachistes, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 109.

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Shorter and stouter than *Eubadison*. Labial palpi triarticulate. Abdomen oblong or ovate, not longer than the thorax; usually only 3 segments visible above in the ♀, the rest retracted or very short; suturiform articulation obsolete, so that segments 2—3 appear as one elongate segment; in the ♂ the 4th and following are less completely concealed; 1st segment broad, conical, truncate, not or hardly longer than its apical breadth; tubercles medial. Legs shorter than in *Eubadison*, the hind pair incrassated. Terebra exserted.

Head broader than the thorax, not much narrowed behind the eyes; vertex transverse; occiput distinctly margined; maxillary palpi 6-jointed, the 4th joint longest; labial palpi consisting of 3 equal joints. Mesothorax elevated, gibbous, its sutures distinct. Abdomen, ♀, appearing biarticulate; segment 1 rimulose; 2—3 connate, and concealing the rest, not margined, smoothly reflexed, so as to cover the sides and unite in a carina in the middle of the belly; the truncate extremity of the 3d leaves a large posterior cavity within which the remaining segments are withdrawn; from the centre of this cavity proceeds the terebra of the ♀, and the apex of the sexual organ of the ♂; in the latter the posterior segments are visible above in the form of 2 or 3 narrow rings beyond the edge of the 3d segment; rarely this is also the case in the ♀. Only the 1st segment of the ♀ is margined at the sides beneath; in the ♂ sometimes the base of the 2d is also margined. For the distinction between this genus and *Sigalphus*, see Trans. Ent. Soc. Lond., 1885, p. 104.

Of the Braconids described by Nees v. Esenbeck, only *Sigalphus fasciatus* (Mon., i., 269) and perhaps *Eubadizon macrocephalus* (Mon., i., 234) belong to this genus. Haliday first established *Calyptus* with 3 species, including *Sigalphus fasciatus*. In the same year appeared Wesmael's *Brachistes* with 4 species, one of which is identical with a species of Haliday; a 5th species was added in 1838 by Wesmael in his Supplement. Ratzeburg, in the Ichn. d. Forst. (1844—52), increased the number of species to 14, one of which is identical with a species of Haliday, and another, *Brachistes fagi*, Ratz., belongs to the genus *Sigalphus*. Reinhard informs us that Ruthe almost completed a MS. monograph of these insects; it has never been published *in extenso*, but a synoptical table by Reinhard, with diagnoses of some new species, appeared in the Berl. ent. Zeit., 1867, pp. 369—374.

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TABLE OF SPECIES.

(6) 1. Hind tibiæ black or blackish, except at the base.
(5) 2. Abdomen with only 3 segments visible above.
(4). 3. First abdominal segment not longer than its apical breadth; tubercles obsolete (♀ unknown) .. .. 1. *puber*, Hal.
(3) 4. First segment ⅓ longer than its apical breadth; tubercles conspicuous (♂ ♀) .. .. 2. *tibialis*, Hal.
(2) 5. Abdomen with 6—7 segments visible above (♀ unknown) .. .. 3. *segmentatus*, n. s.
(1) 6. Hind tibiæ rufous or testaceous.
(8) 7. All the coxæ black or fuscous, except sometimes on the under side .. .. .. 4. *fasciatus*, Nees.
(7) 8. All the coxæ testaceous .. .. .. 5. *sigalphoides*, n. s.

1. *Calyptus puber*, Hal.

Calyptus puber, Hal., Ent. Mag., iii., 130, ♂.

Black; legs ferruginous, coxæ blackish at the base; hind tibiæ and tarsi fuscous, the former ferruginous at the base; 1st segment short, stout, punctato-rugulose. Body shining, covered with a close whitish pubescence; mandibles black at the base. Antennæ 31-jointed, longer than the body. Wings dull hyaline, stigma and nervures fuscous, squamulæ piceous with a rufescent margin. Metathorax punctate, marked with elevated lines forming areæ, of which the middle one is pentagonal. First abdominal segment not longer than its apical width, which is twice that of the base; basal angles obtusely carinated; tubercles obsolete; the remaining segments irregularly punctulate, with whitish hairs; 2d segment about twice as long as the 1st; 3d segment rugulose at the extremity. Hind coxæ nigro-fuscous above; hind tibiæ fuscous, broadly ferruginous at the base, their tarsi almost entirely fuscescent; the 4 anterior tarsi at the tips only. Female unknown. Length, 1¾; wings, 4 lin. Haliday.

Taken sparingly by Haliday in woods on the banks of the Shannon. Otherwise unknown, and not to be identified with any of the continental species. The synonym *Brachistes nigricoxis*, Wesm., given in my catalogue, seems now too doubtful to be maintained; so also Reinhard's conjecture as to the identity of *B. uncigenis*, Wesm. However, the form of the 1st segment seems to be the only difference between this and the following species, and it is quite possible that they may be the same.

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2. *Calyptus tibialis*, Hal.

Calyptus tibialis, Hal., Ent. Mag., iii., 130, ♂ ♀.
Brachistes uncigenis, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 113, ♂ ♀; Ratz., Ichn. d. Forst., iii., 27, pl. ii., f. 38 (abdomen).

Black, shining; thinly pubescent with short whitish hairs; mandibles rufous except at the base; palpi and legs rufo-testaceous, hind coxæ black above, fuscous beneath; hind tibiæ and tarsi blackish, the former testaceous at the base. Antennæ ♀ as long as the body, with 30 cylindrical joints diminishing in length towards the extremity; 2d joint usually dull testaceous: antennæ ♂ one-fourth longer, 32-jointed. Face punctate, dull, with a deep fovea on each side above the clypeus, and a shallow central depression; clypeus transverse, rounded in front, punctate; under each eye is a short, shallow groove; cheeks emarginate close to the base of the mandibles, forming on each side a dentiform process flattened against the surface and not easily seen. Pronotum rugulose. Mesothoracic sutures strongly incised, punctate. Scutellum small; ante-scutellar fovea large, punctate, bisected by a carina. Metathorax as in the last species. Wings slightly infumated, stigma and nervures fuscous, squamulæ testaceous. Abdomen as long and as broad as the thorax, flattened above, shining, with parallel sides, truncated at the end of the 3d segment, beneath which, in the ♀, the remaining segments are concealed; in the ♂ they project slightly. First segment rather longer than its apical width, which is about 8 times that of the base, rugulose; tubercles obtusely prominent; two lateral carinæ extend from the base nearly to the middle; 2d segment marked with shallow punctures, often very indistinct. Terebra straight, as long as the body. Size variable. ♂ ♀. Length, 1½—2; wings, 2¾—4 lin.

Described from 5 females and 19 males. Taken by Haliday in the woods of northern Ireland; locally common in England, and especially in a wood close to my house at Nunton, Wilts; I have also specimens from Leicestershire and Herts. Wesmael possessed a series taken on old palings and windows at Brussels; he suspected them to be parasites of *Anobium*.

3. *Calyptus segmentatus*, n. s.

Niger, nitidus, abdomine nonnunquam picescente; pedes cum coxis pallide testacei; tibiæ posticæ cum tarsis præter basin fuscæ;

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tarsi 4 anteriores apice fusci. Maris antennæ corpore longiores, totæ nigræ, 27-articulatæ; palpi pallidi. Prothorax punctulatus, nitidus. Mesothoracis sulculi impunctati. Metathorax a basi inde declivis, postice haud truncatus, indistincte areatus, nitidus. Alæ hyalinæ stigmate fusco, nervis pallidioribus, ultra stigma fere deletis; areola radialis subcultriformis, radio vix nisi recto. Abdomen depressum, thorace brevius, ovatum, lateribus rotundatis; segmentum 1um latitudine sua apicali paulo longius, apice quam basi sesquilatius aciculatum, carinis 2 longitudinalibus ante marginem posticum obsoletis, basi ipsa testaceum, tuberculis fere inconspicuis; cætera lævia, nitida; segmentum 2um 1o haud brevius, postice latius; 3um quadruplo brevius; sequentia exserta, 3o non breviora sed latitudine sensim decrescentia; 7um subito angustatum. Femina latet.

Black, shining, abdomen sometimes inclining to piceous; legs pale testaceous, including the coxæ; hind tibiæ and tarsi dusky, except the base of the former; 4 anterior tarsi dusky at the tips. Antennæ ♂ longer than the body, entirely black, 27-jointed. Palpi pale. Prothorax punctulate, shining. Mesothoracic sutures impunctate. Metathorax inclined from the base, not truncate behind, indistinctly areated, shining. Wings hyaline, stigma fuscous, nervures paler, nearly effaced beyond the stigma; radial areolet subcultriform, radius almost straight. Abdomen shorter than the thorax, depressed, ovate, with rounded sides; 1st segment rather longer than its apical width, which is only one-half greater than that of the base, aciculated, with 2 longitudinal carinæ, effaced before the hind margin; the extreme base testaceous; tubercles indistinctly prominent; the remaining segments smooth and shining; 2d segment as long as the 1st, widest behind; 3d only a quarter as long; 4th—7th exserted, as long as the 3d and successively diminishing in width; 7th abruptly narrower. Female unknown. Length, 1½; wings, 2½ lin.

Described from 3 males in Fitch's collection, which are there named *claviventris*, Ruthe; that author, however, describes only the ♀, and says nothing about the exsertion of the posterior segments, unusual in the genus, and which may or may not be a characteristic of the ♂ in this species. *C. exsertor*, Ruthe, has the posterior segments conspicuous in both sexes, but the present insects cannot be referred to that species, the 1st segment of which is shorter than its apical width.

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4. *Calyptus fasciatus*, Nees.

Sigalphus fasciatus, Nees, Mag. Ges. Berl., 1816, p. 250; Mon., i., 269 (♀ only); *C. fasciatus*, Hal., Ent. Mag., iii., 129, ♀.

Black, shining, minutely pubescent; abdomen often piceous; legs piceo-rufous, with black coxæ, short and stout. Palpi and mandibles testaceous. Clypeus irregularly impressed. Antennæ ♀ black, filiform, submoniliform towards the apex, as long as the body, 20-jointed, the joints shorter than in the rest of the species; those of the only ♂ at hand are mutilated. Prothorax smooth. Mesothorax very gibbous, concave in front, and projecting over the prothorax; sutures distinct, scarcely punctate. Metathorax very short, truncate, punctulate, somewhat shining, areated in 3 narrow compartments beneath the scutellum, the medial compartment rounded behind. Wings brownish hyaline, with an indistinct transparent streak under the stigma, which, with the nervures, is fuscous; radial areolet short, ovate, acuminate. Abdomen somewhat shorter and narrower than the thorax, flattened above, with subparallel sides, truncated at the end of the 3d segment, which, in the ♀, conceals the rest; in the ♂ the posterior segments are slightly exserted; 1st segment rugulose, dull, deplanate, rather shorter than its apical width, which is twice that of the base; 1st suture deeply incised; at the base are two short carinæ; tubercles not prominent; 2d and 3d segments smooth and very shining, deplanate; 2d segment shorter than the 1st and longer than the 3d. Terebra stout, somewhat decurved, a little shorter than the abdomen. ♂ similar in all respects. Length, 1; wings, 2¼ lin.

The ♂ described by Nees von Esenbeck, having the 1st segment smooth, the hind legs elongate, &c., clearly belongs to some other species; the true ♂, which I have taken, resembles the other sex. Nees and Haliday possessed each a single ♀, and the species is not noticed by other writers. I have taken 5 females and 1 male on *Umbelliferæ* at Barnstaple, St. Albans, and Nunton, Wilts.

5. *Calyptus sigalphoides*, n. s.

Præcedente minor et gracilior. Piceus, capite nigro, palpis pallidis, genis infra oculos longius descendentibus. Antennæ ♀ graciles, corpore longiores, basi obscure testaceæ apicem versus nigricantes, 23-articulatæ; articuli 10 priores lineares, sensim longitudine decrescentes, cæteri submoniliformes. Thorax compressus, capite angustior. Prothorax pallide piceus, punctulatus,

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obscurus; mesothorax gibbosus, suturis lævibus; metathorax sensim declivis, haud truncatus, areatus, lateribus bidentatus; areæ superiores læves, nitidæ, inferiores obscuræ. Alæ hyalinæ stigmate magno piceo, nervis pallidioribus ultra stigma pæne obsoletis; areola radialis ovato-acuminata. Abdomen ovatum, depressum, thorace brevius; segmentum 1um transversum, aciculatum, marginatum, rufescens, apice quam basi duplo fere latius, disci carinis duabus longitudinalibus ante marginem posticum deletis; sutura 1ma profundissima; segmentum 2um 1mo æquale, 3tio paulo longius, aciculatum, deplanatum; 3tium lateribus parallelis, marginibus basin versus aciculatis; cætera lævia, nitida; segmentum 3tium medio obtuse carinatum, postice truncatum; 4tum subexsertum, testaceum. Terebra abdominis trientem longitudine æquans, nonnihil decurva. Mas incognitus.

Smaller and more slender than the preceding. Piceous, the head black; palpi pale; cheeks descending considerably below the eyes. Antennæ ♀ slender, longer than the body, obscurely testaceous at the base, blackish towards the extremity, 23-jointed; the first 10 joints linear, gradually decreasing in length, the rest submoniliform. Thorax compressed, narrower than the head. Prothorax pale piceous, punctulate, dull; mesothorax gibbous, its sutures impunctate; metathorax not truncated behind, but sloping gradually, areated, the superior compartments smooth and shining, the rest dull; bidenticulate at the sides. Wings hyaline, stigma large, piceous nervures paler, nearly effaced beyond the stigma; radial areolet ovate, acuminate. Abdomen ovate, depressed, shorter than the thorax; 1st segment transverse, aciculated, margined, rufescent, almost twice as wide at the extremity as at the base, with 2 longitudinal carinæ on the disk effaced before the hind margin; 1st suture deeply incised; 2d segment as long as the 1st and rather longer than the 3rd, aciculated, deplanate; 3d segment with parallel sides, aciculated laterally at the base only; the rest of the abdomen smooth and shining; segment 3 obtusely carinated down the middle, truncate behind; segment 4 subexserted, testaceous. Terebra as long as ⅓ of the abdomen, somewhat decurved. Male unknown. ♀. Length, 1; wings, 2⅓ lin.

The only specimen was taken in a meadow in Northamptonshire.

Obs. The above may seem a meagre account of this genus, of which 20 species are indicated by Reinhard; but I have seen no more than 5 of British origin, though others in all probability exist. Some specimens 2¼ lines long have long stood in my collection for *atri-*

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cornis, Ratz. They were taken in Mar Forest, Scotland; and to them have been added more recently others found by Mr. G. C. Champion in the Highlands. A closer examination than they had previously received now shows them to be *Allodorus semirugosus*, Nees, belonging to the *Sigalphides*, respecting which see Trans. Ent. Soc. Lond., 1885, p. 103. I can only regret that they were not recognised in time to be inserted in their proper place. This and other discoveries I hope to be able to bring forward hereafter as a supplement at the end of these papers.

XVII. BLACIDES.

Maxillary palpi 5—6-, labial 3—4-jointed. Abdomen sessile or subsessile, with 8 visible segments above; suturiform articulation obsolete. Fore wings with 2 cubital areolets, the 1st separated from the prædiscoidal; radial areolet cultriform, extending nearly to the apex of the wing; radius straight; axillary areolet not divided by a transverse nervure; recurrent nervure evected or interstitial; cubital nervure more or less obsolete; podiscoidal areolet not closed. Terebra of variable length, deflexed or straight.

The *Blacides* are nearly allied to the *Liophronides*, with which Haliday associated the first genus, *Pygostolus*. The most obvious distinctions are to be found in the structure of the abdomen of the females, and in the wings of both sexes. In the *Blacides* the radius is straight, and its 1st abscissa distinct, being equal in length to the thickness of the stigma, or nearly so; the abdomen of the ♀ is never decurved at the extremity, and the terebra is directed, as usual, backwards. In the *Liophronides* the radius is curved, and its 1st abscissa much shorter; the abdomen of the ♀ is decurved at the apex, so that the terebra points forwards.

Nees von Esenbeck published in 1834 (Mon., i., 189) a genus *Blacus* with two sections, but so indistinctly conceived as to include in the 2d section three of the *Aphidiides*; while in the same work his genus *Bracon* begins with two more *Blacides*, associated with two of the *Liophronides*. The *Blacus* of Wesmael (1835) is correctly defined, and coextensive with the present subfamily. Haliday, in the same year, characterised the genus *Blacus*, making two subgenera, *Blacus* and *Ganychorus*, and removed two aberrant species, the *Ichneumon*

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sticticus, Fab., and *Leiophron falcatus*, Nees (which Wesmael had regarded as *Blaci*) to another subgenus *Pygostolus*, arranged under *Leiophron*. The step is to a great extent justified by the transitional characters of the two species, though they are unquestionably better placed in the present group. Ruthe's paper on *Blacus* contained in the Berl. ent. Zeit. for 1861, confirms Wesmael's views as to the affinities of *Pygostolus*. Haliday's *Ganychorus* must be abandoned, for reasons which will shortly appear; so also *Goniocormus*, Först.; there remain, then, the two following genera, easily distinguished :—

Prædiscoidal areolet petiolated, not touching the parastigma; 1st joint of the flagellum shorter than the 2d .. .. i. PYGOSTOLUS.

Prædiscoidal areolet not petiolated, touching the parastigma; 1st joint of the flagellum almost always longer than the 2d .. .. ii. BLACUS.

i. PYGOSTOLUS, *Hal.*

Hal., Ent. Mag., ii., 459; Ruthe, Berl. ent. Zeit., 1861, p. 157.

Head transverse; face subquadrate; clypeus gibbous; mandibles projecting, armed with 2 unequal teeth; maxillary palpi 5-, labial 4-jointed (at first sight 3-jointed, the penultimate joint being very minute). Occiput margined on its lower edge only. Mesothorax trilobate, with distinct sutures. Metathorax well-developed, regularly convex, not areated. Recurrent nervure interstitial, or nearly so; cubital nervure springing from the præbrachial transverse.

Of this very natural genus there are 3 known European species, but only 2 have been found in the British Isles. Their ground colour is testaceous, with a few blackish portions, which are variable, but usually include the metathorax; there exists also a dusky variety of *P. falcatus*. Head somewhat narrower than the thorax; antennæ longer than the body, setaceous rather than filiform, 1st joint of the flagellum always a trifle shorter than the 2d; lower tooth of the mandibles shorter than the upper one, and more inclined inwards. Mesothorax gibbous, its lobes separated by deep sutures. Furrow of the mesopleuræ wide, shallow, faintly rugose or crenate, and somewhat curved. Ante-scutellar foveæ wide and deep, geminated by a carina. Metathorax elongate, not much depressed below the mesothorax, regularly convex, without the horizontal and vertical portions seen in *Blacus*. Wings ample,

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reaching in repose much beyond the extremity of the abdomen; nervures pale, with some dark portions (as in *Ophion* and other testaceous insects); radius straight, originating usually beyond (seldom from) the middle of the stigma; pobrachial areolet longer than the præbrachial. Legs stout, proportionally shorter than those of *Blacus;* the hind tarsi, especially, are much shorter than their tibiæ. The British species may be recognised at a glance, even by their size.

Antennæ 33—34-jointed; terebra scarcely half as long as the abdomen, straight; length, 2¼ lines .. 1. *sticticus*, Fab.
Antennæ 29—30-jointed; terebra as long as ⅔ of the abdomen, falcate; length, 1½—2 lines .. .. 2. *falcatus*, Nees.

1. *Pygostolus sticticus*, Fab.

Ichneumon sticticus, Fab., E. S., Suppl., 229; *Cryptus sticticus*, Fab., Piez., 89, ♀; *P. sticticus*, Hal., Ent. Mag., ii., 459; Ruthe, Berl. ent. Zeit., 1861, p. 162, ♀.
Bassus testaceus, Fall., Spec. Hym. (not of Fab.), ♀.
Blacus gigas, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 99, ♀.

Rufo-testaceous, smooth and shining; eyes, stemmaticum, occiput, variable portions of the mesothorax and pleuræ, the pectus and sometimes the scutellum, also the metathorax, and base of the 1st abdominal segment, fuscous. Palpi whitish. Antennæ dull ferruginous, darker towards the tips, each joint of the flagellum annulated with fuscous at the extremity. Metathorax punctato-rugose, without raised lines or areæ. Wings hyaline, stigma yellow; costa, radius, anal nervure and part of the præbrachial, fuscous, the other nervures ferruginous; cubital nervure obsolete for a great portion of its length. Abdomen shorter than the thorax, and at its widest part not narrower, oblong-ovate above; if viewed laterally, obliquely truncate behind; the sides of the 1st segment diverge as far as the obtusely prominent tubercles, which are placed before the middle; thence to the apex the sides are nearly straight and parallel; 1st segment minutely aciculated, the rest smooth; suturiform articulation faintly visible at the sides. Valves of the terebra lanceolate, stout, black, pilose. Male unknown. Length, 2¼; wings, 6 lin.

Not common; a solitary parasite of *Tenthredinidæ*, and sometimes of Lepidoptera. It has been bred from *Nematus ribesii*, Scop., and *Macrophya ribis*, Schr. In Scott's collection I saw one reared from *Pterostoma*

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palpina, L., and another from *Depressaria angelicella*, Hüb. I obtained two specimens by beating an alder-tree near Abergavenny, and a third by sweeping in a marsh near Cornworthy in S. Devon. Cameron's collection contains two, one taken at Kenmuir in Scotland; the other he reared from a reddish-grey cocoon, rough, dull, and felted, attached to the stalk of a plant on the shores of Loch Awe. This cocoon differs in colour and size from that of *P. multistriatus*, Ratz., of which I possess an example, together with the perfect insect, from Switzerland, presented to me by the kindness of Mr. Bignell. The latter cocoon is white, and nearly 5 lines long; those observed by Ratzeburg were brownish grey. *P. multistriatus*, Ratz., is likely to be found in England; it is 2—4 lines long, formed like *sticticus* and *falcatus*; antennæ 34—36-jointed; the colour of my specimen and Ruthe's is rufo-testaceous without any mixture of fuscous; but others apparently vary like their congeners. Ratzeburg's three specimens were hatched out of cocoons attached to the needles of fir-trees; that author has figured the ♂, which seems to be smaller than the ♀. The individual referred to by Wesmael (Nouv. Mém. Ac. Brux., 1838, p. 144) under *B. falcatus*, and which was sent from Liège by M. Carlier, belongs undoubtedly to this species; it is preserved in the Brussels collection.

2. *Pygostolus falcatus*, Nees.

Leiophron falcatus, Nees, Mon., i., 44; *Blacus falcatus*, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 101, ♀; Tappes, Ann. Soc. Fr., 1869, pl. i., f. 16, ♂; *P. falcatus*, Hal., Ent. Mag., iii., 20, ♀; Ruthe, Berl. ent. Zeit., 1861, p. 158, ♂ ♀.

Similar to the preceding, but much smaller. Rufo-testaceous, unicolorous or varied with fuscous, *vis.*, on the stemmaticum, occiput, metathorax, and posterior portion of the pectus, together with the base and apex of the abdomen. Antennæ longer than the body, filiform, 29—30-jointed (in 20 examples). Wings as in *sticticus*, but the yellow stigma is often more or less infuscated, and the recurrent nervure somewhat rejected, seldom interstitial. Metathorax punctato-rugulose, sometimes with vestiges of 2 medial and 2 lateral carinæ. First abdominal segment faintly aciculated or nearly smooth, especially at the apex. Terebra decurved, with

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stout black valves, pilose beneath. ♂ similar; abdomen rounded at the extremity, instead of being vertically truncate. Length, 1½—2; wings, 3¾—4¾ lin.

Var. 1. Fuscous, palpi and legs testaceous; base of the antennæ, orbits of the eyes, face, anterior pleuræ and basal half of the belly, rufous. Ruthe. I have taken an English specimen of this variety.

Var. 2. Entirely rufo-testaceous; cubital nervure obsolete to its base, so that the 1st cubital areolet is no longer separated from the prædiscoidal. Ruthe.

Commoner than *sticticus*, but I can find no record of its having been bred except that of Tappes (*l. c.*), who obtained the ♂ out of *Cryptocephalus bipunctatus*, L.

ii. Blacus, *Nees.*

Blacus, Nees, Act. Ac. L. C., 1819, p. 306 [this reference shows nothing except the origin of the name]; Hal., Ent. Mag., iii., 39; Wesm., Nouv. Mém. Ac. Brux., 1835, p. 91 [including *Pygostolus*]; Ruthe, Berl. ent. Zeit., 1861, p. 132.

Head small, subglobose; occiput margined above and below; maxillary palpi 6-, labial 3-jointed. Antennæ ♀ 17—24-jointed (usually 17—20); those of the ♂ 19—26-jointed (usually 19—21—22); 1st joint of the flagellum generally longer than the 2d. Thorax compressed; mesothorax trilobed, its sutures distinct; metathorax not gibbous as in *Pygostolus*, but inclined posteriorly almost from the base, partially areated by cariniform lines. Wings sometimes abbreviated in the ♀; recurrent nervure entering the 1st cubital areolet near its apex. Abdomen not shorter than the thorax, and much narrower at the base, gradually widened behind in the ♂, or compressed in the ♀; subsessile or almost petiolated; 1st segment oblong, tubercles ante-medial; anus truncated in the ♀, rounded in the ♂. Legs more elongate and slender than in *Pygostolus*, stouter in the ♀; hind tarsi as long as their tibiæ, or nearly so. Terebra variously exserted; anal forceps of the ♂ protruded.

About 19 European species are described, 9 of which are British, and I have added one remarkable new form. The insects are mostly slender and gnat-like, black or piceous (rarely with some rufous portions), and with testaceous legs. *Blacus* is here understood in the sense of Ruthe's monograph above quoted, not that of Wesmael,

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whose description includes *Pygostolus*. Haliday divided the genus into two subgenera, as follows:—

Antennæ of the ♂ 19-, of the ♀ 17-jointed; claws simple	*Blacus*.
Antennæ ♂ ♀ with a greater number of joints; claws pectinated	*Ganychorus*.

In the Synopsis at the end of Westwood's 'Introduction,' he abandoned the character derived from the antennæ, for the reason that, from this point of view, one species, *hastatus*, belongs to *Blacus* in the ♀ sex, while its ♂ is a *Ganychorus*. There remains then only the pectination of the claws to distinguish *Ganychorus*; this by itself is no foundation for a genus, and it seems better to adopt the method of Ruthe and Reinhard, who recognise only the genus *Blacus*. *Goniocormus*, Först., is another artificial genus with which we may well dispense.

The species of *Blacus* frequent damp shady places in woods, where some of the commonest occur in great numbers, associated like winged ants at the time of swarming; the males dance in the air like gnats; the females are less active, and creep amongst moss and herbage; these latter may sometimes be found hybernating. Their parasitism is rather conjectured than known, but the few indications we have connect them with small Coleoptera and Diptera. Some of the species are most difficult to distinguish, especially in the ♂ sex, and I can scarcely hope that the following table will always be found to apply satisfactorily. Haliday's divisions were made without uniform reference to the ♂ sex; and Ruthe's tabular sections, though in appearance complete, will be found deficient in the same respect, since in many cases he possessed only females. *B. longipennis*, Nees, will be omitted here, although it was inserted in my catalogue on the authority of Curtis's 'Guide'; it was not in his collection, and was unknown to Haliday, and other writers since Nees; the only mention of it is in a list of Russian insects by Kawall; it is perhaps a synonym of *paganus*, Hal.

Table of Species.

(16) 1. Wings ♂ ♀ fully developed.

(3) 2. Antennæ 24—26-jointed .. .. 1. *tuberculatus*, Wesm.

(2) 3. Antennæ with fewer than 24 joints.

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(7) 4. Posterior angles of the metathorax not produced or dentiform.

(6) 5. Legs flavo-testaceous; hind femora not infuscated .. .. 2. *ruficornis*, Nees.

(5) 6. Legs rufo-testaceous; hind femora infuscated before the apex .. .. 3. *maculipes*, Wesm.

(4) 7. Posterior angles of the metathorax more or less produced and dentiform.

(9) 8. Antennæ ♀ 19-jointed; ♂ 22-jointed 4. *tripudians*, Hal.

(8) 9. Antennæ ♀ 17-jointed; ♂ 19—20- (rarely 21-) jointed.

(11) 10. Length, 1 line or less; the smallest species .. .. 5. *humilis*, Nees.

(10) 11. Length, 1¼—1½ lines, which is the usual size.

(13) 12. Radial areolet about twice as long as its greatest breadth; terebra ♀ ½ longer than the abdomen .. .. 6. *hastatus*, Hal.

(12) 13. Radial areolet about three times as long as its greatest breadth; terebra ♀ much shorter than the abdomen.

(15) 14. ♂. Anterior angle of the prædiscoidal areolet complete, not being cut off by the parastigma. ♀ antennæ not longer than the head and thorax, and not incrassated at the apex .. 7. *paganus*, Hal.

(14) 15. ♂. Anterior angle of the prædiscoidal areolet cut off by the enlarged parastigma. ♀ antennæ rather longer than the head and thorax, incrassated towards the apex .. .. 8. *trivialis*, Hal.

(1) 16. Wings abbreviated; females only.

(18) 17. Antennæ 18-jointed .. .. .. 9. *aptenodytes*, n. s.

(17) 18. Antennæ 20-jointed.

(20) 19. Hind femora annulated with fuscous before the apex; terebra as long as the abdomen .. .. 10. *ambulans*, Hal.

(19) 20. Hind femora unicolorous; terebra shorter than ½ of the abdomen .. 2. *ruficornis*, var.

1. *Blacus tuberculatus*, Wesm.

Blacus tuberculatus, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 98; Ruthe, Berl. ent. Zeit., 1861, p. 132, ♂ ♀.

Ganychorus pallipes, Hal., Ent. Mag., iii., 41, ♂ ♀.

Bracon barynoti and *otiorhynchi*, Boudier, Ann. Soc. Fr., 1834, pp. 333, 334, pl. xi.

? *Blacus Florus*, Goureau, Ann. Soc. Fr., 1851, p. 137, ♀.

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Black, abdomen sometimes piceous in the middle; palpi and legs pale ochraceous; oral parts dull rufous. Antennæ ♀ 24-jointed (rarely 25), as long as the body, ferruginous; scape, extreme base of the following joints, and 5-6 apical joints entirely, fuscous. Prothorax produced, forming a sort of neck, rugulose; mesothorax shining, with deep converging sutures; mesopleuræ also smooth and shining, with a shallow punctate furrow; scutellum subacutely elevated at the apex, slightly rugulose, distinctly margined; metathorax short, carinated longitudinally, finely rugulose, almost reticulated; 2 dorsal areæ faintly defined posteriorly and at the sides, behind them are two less distinct areæ. Wings hyaline, as long as the whole body, nervures and stigma yellow. Legs longer and more slender than in other species; claws, and extreme base of the hind coxæ, fuscous. Abdomen ♀ subclavate; 1st segment forming scarcely ⅓ of its length, linear, slightly dilated behind, rugose; tubercles prominent, placed before the middle; the other segments smooth and shining. Terebra as long as ¼ of the abdomen. ♂ similar; antennæ longer, 25—26-jointed, fuscous, base of the flagellum usually ferruginous; parastigma and apex of the stigma fuscescent; legs longer, last joint of the tarsi fuscous; abdomen linear, not subclavate. Length, 2; wings, 4½ lin.

Described from 14 specimens. Found not uncommonly in woods throughout the kingdom. It is the largest species, and distinguished by the greatest number of joints in the antennæ. Bred by Boudier from larvæ of *Otiorrhynchus ligneus*, Ol., and *Barynotus mærens*, Fab., at Montmorency. The evidence of the identity of Boudier's parasites with the present species, though much of it is of a negative character, seems tolerably conclusive, and is borne out by the figures. With *Blacus Florus*, Goureau, the case is different; but if this belongs to the genus *Blacus* at all, it must be *tuberculatus*, Wesm., for the description is applicable to no other species. Goureau records it as a parasite of *Agromyza nana*, Meig., which mines the leaves of *Iris pseudacorus*; but the small size of the fly compared with that of the parasite renders this incredible, as indeed Goureau himself acknowledged.

2. *Blacus ruficornis*, Nees.

Bracon ruficornis, Nees, Mon., i., 49, ♂ ♀ (not his var. β).

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Blacus ruficornis, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 92; Ratz., Ichn. d. Forst., ii., 61; Ruthe, Berl. ent. Zeit., 1861, p. 134, and Stett. Zeit., 1857, p. 160 (ein Bracon-Zwitter), ♂ ♀.

Ganychorus ruficornis, Hal., Ent. Mag., iii., 42, ♂ ♀.

Dark fuscous, slender, abdomen sometimes piceous or testaceous in the middle; mandibles and clypeus rufescent; palpi and legs testaceous. Antennæ ♀ stout, somewhat shorter than the body, filiform, rufo-testaceous, 20—21-jointed (the 2 apical joints often appearing to be united); scape and apical joints of the flagellum usually fuscous, the others annulated with fuscous at the extremity; subapical joints longer than broad. Prothorax punctato-rugulose, smooth at the sides above; scutellum less elevated than in the last species; metathorax short, finely rugulose and reticulated, almost vertical posteriorly, divided into 4 areæ, and longitudinally carinated. Wings broader than in most species, subhyaline; stigma brown, more or less pale, or with pale spots; cubital and some other nervures fuscous, the rest pale brown; parastigma yellowish, smallest in the ♀, so that the angle of the prædiscoidal areolet is not cut off. Last joint of the tarsi infuscated. Abdomen subclavate; 1st segment narrow, hardly dilated posteriorly, more or less distinctly rimulose, faintly margined, not canaliculated; the following segments smooth, having each a transverse row of faint punctures before the hind margin. Terebra about ⅓ of the abdomen. ♂. Antennæ setiform, black, narrowly testaceous at the base, as long as the body, 21—22-jointed; wings somewhat whitish, elongate; stigma stramineous; parastigma enlarged, cutting off the angle of the prædiscoidal areolet; abdomen slender, hardly subclavate; 1st segment canaliculated. Length, 1½; wings, 3½ lin.

Var. ♂ ♀. Rufo-castaneous; head, apex of the abdomen, and sometimes the 1st segment and metathorax, fuscous.

Obs. I have a ♀ with abbreviated wings, probably belonging to this species. Antennæ 20-jointed; hind femora not infuscated before the apex (*cf.* sp. 3); wings very narrow, not reaching the apex of the abdomen; stigma placed near the extremity; radial areolet contracted, not longer than the stigma; radius curved; 1st cubital areolet not separated from the prædiscoidal; metathorax vertical behind, not bidenticulate. Terebra less than ⅓ of the abdomen. Length, 1; wings, ¾ line.

Ruthe has described a hermaphrodite, either of this species or the following, in which the antennæ, wings, &c., do not correspond, being of opposite sexes.

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An abundant species throughout Europe, and found gregariously on bushes in shady places; some of the females live more than one season in this country, and may be found in winter among dead leaves or moss, especially at the roots of trees. Ratzeburg records the breeding of a specimen by Dahlbom, at Lund, on Sept. 7th, from a *pupa* of *Cionus fraxini*, DeGeer.

3. *Blacus maculipes*, Wesm.

Blacus maculipes, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 94; Ruthe, Berl. ent. Zeit., 1861, p. 139, ♂ ♀.

Bracon ruficornis, var. β, Nees, Mon., i., 49.

Ganychorus diversicornis, Hal., Ent. Mag., iii., 43, ♂ ♀ (not of Nees).

Uniformly black, or with the 2d abdominal segment piceous; mouth and legs rufo-testaceous, hind femora infuscated before the apex. ♀ antennæ shorter and stouter than in *ruficornis*, hardly equalling ¾ of the body, submoniliform, 20-jointed, rufo-testaceous, the 1st and last joints, and sometimes more of the subapical ones, blackish. Sides of prothorax finely rugulose, smooth above; mesopleuræ smooth, or hardly striated in the middle; scutellum smooth; metathorax short, gibbous, subvertical behind, finely and irregularly rugulose, with 4 areæ, of which the 2 dorsal are nearly smooth. Wings somewhat infumated, shorter and narrower than those of the ♂; stigma and most of the nervures brownish. Legs stouter and shorter than in the ♂; 1st abdominal segment stouter, wider behind; tubercles inconspicuous. Terebra somewhat longer than ⅓ of the abdomen. ♂. antennæ 21-jointed, longer than the body, the 1st or 1st and 2d joints testaceous. Wings ample, as long as the body, subhyaline, nervures stramineous, stigma more or less brownish; parastigma pale, with a brown longitudinal streak; the stigma is darkest when the antennæ are most broadly pale at the base. Legs elongate, yellowish, with hardly a rufous tinge; hind pair visibly granulated; tarsi infuscated towards the apex; so also the hind femora, and sometimes their tibiæ, with the base of their coxæ. Tubercles of the 1st segment salient. Length, 1¼; wings, 3 lin.

I have not met with this species, and the description is taken from the authorities cited, with the synonymy given by Reinhard. Taken formerly by Haliday in Ireland, less commonly than *ruficornis*.

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4. *Blacus tripudians*, Hal.

Ganychorus tripudians, Hal., Ent. Mag., iii., 41, ♂ ♀.
Blacus rufescens, Ruthe, Berl. ent. Zeit., 1861, p. 141, ♂.

♀. Nigro-piceous, 2d abdominal segment paler; legs pale ochreous; mouth and clypeus rufescent. Antennæ 19-jointed, ferruginous, scape and apex fuscescent. Thorax as in *B. tuberculatus*, but the hind angles of the metathorax are dentiform. Wings hyaline, stigma, radix, and squamulæ pale ochreous, most of the nervures decolorous, the rest pale fuscous. Legs slender; last joint of tarsi (at least of the 4 anterior), and claws, fuscous. Terebra hardly as long as ⅓ of the abdomen. ♂ variable, fuscous, or rufo-castaneous, with the head and posterior segments of the abdomen fuscescent. Palpi pale, fuscous at the base. Antennæ a little longer than the body, 22-jointed, fuscous, ferruginous at the base; 2 first joints of the flagellum almost equal in length. Prothorax rufo-testaceous, punctato-rugulose; mesothorax more or less brown or rufous; pectus often rufescent; scutellum not very prominent, obtuse; mesopleuræ punctato-rugulose, with a shining medial space; metathorax not gibbous, almost straight from the base to the apex, punctate, almost reticulato-rugose, tricarinated, ferruginous; the 2 lateral carinæ end in dentiform processes. Wings broad, greyish hyaline, nervures and stigma brown, radix and squamulæ more rufous; 1st and 2d abscissa of the radius straight, forming a right angle; 1st abscissa originating behind the middle of the stigma, and longer than the intercubital nervure; anterior angle of the prædiscoidal areolet not truncated by the parastigma. Legs elongate; hind tibiæ and tarsi somewhat infuscated, the latter hardly as long as the former. Abdomen not quite so long as the head and thorax, fuscous; the 1st segment often rufous, impressed at the base, not much dilated posteriorly, and there only striated. Length, 1⅓; wings, 3⅓ lin.

Not so common as *ruficornis;* according to Haliday gregarious, frequenting willows (*Salix caprea*) in large numbers; the males sport together in airy dances on warm, sunny afternoons, like the gnats of the genus *Chironomus*. I have observed a similar habit in another species—probably *ruficornis*—but of *tripudians* I have only taken a few isolated examples. Ruthe conjectured that his *Blacus mamillanus* might be the ♀ of this species, but this is sufficiently disproved by the descriptions.

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5. *Blacus humilis*, Nees.

Blacus humilis, Nees, Mon., i., 191; Hal., Ent. Mag., iii., 121, ♂ ♀; Wesm., Nouv. Mém. Ac. Brux., 1835, p. 95, partly; Ruthe, Berl. ent. Zeit., 1861, p. 148, ♀.

B. exilis, Nees, *l. c.*

Dacnusa cerealis, Curt., Farm. Ins., 294.

♀. Black or piceous: mouth paler, mandibles ferruginous; palpi fuscescent. Antennæ 17-jointed, ⅓ shorter than the body, incrassated towards the tips, blackish, paler at the base. Mesopleuræ almost smooth, with a punctate longitudinal furrow; metathorax subtruncate behind, obtusely prominent, very finely rugulose, almost smooth in the middle; posterior angles minutely dentiform. Wings narrow, subhyaline, stigma and nervures pale piceous, costa and squamulæ darker; anterior angle of the prædiscoidal areolet complete in both sexes. Legs slender, piceous-brown or ochraceous; tibiæ and tarsi paler, except at the tips; 4 posterior coxæ infuscated. Abdomen compressed, hardly longer than the thorax; 1st segment linear, oblong, convex, rugulosely punctate, finely margined; the other segments smooth. Terebra as long as ⅓ or ⅖ of the abdomen, somewhat decurved. ♂ similar; antennæ 19—20-jointed, filiform, longer than the body; abdomen narrower, linear; legs more slender, but hardly longer. Length, 1; wings, 2 lin.

The smallest species, much resembling *trivialis*, Hal., but, besides the inferior size, it differs in the antennæ of the ♀, which are longer, and incrassated towards the apex; the medial joints of the flagellum are also more elongate; the subapical joints ovate, decreasing gradually in length. The dentiform processes of the metathorax are very small, and only 2 in number, instead of 4, as in *paganus*, Hal.

Var. 1. Only ¾ of a line long; wings narrower; legs more slender; metathorax hardly bidenticulate. The antennæ of the specimen here referred to were not a pair, the joints of either side differing in length and form. Ruthe.

Var. 2. Length, 1¼; wings, 2⅓ lines. ♀. Abdomen hardly compressed, subclavate; nervures of the wings stouter. Haliday.

Var. 3. Antennæ not longer than the head and thorax, incrassated at the apex. Haliday.

This species is evidently a parasite of some insect feeding upon ears of corn: it may be obtained by sweeping in wheat-fields.

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6. *Blacus hastatus*, Hal.

Blacus hastatus, Hal., Ent. Mag., iii., 121, ♀.
B. terebrator, Ruthe, Berl. ent. Zeit., 1861, p. 142, ♂ ♀.

Black, mouth and legs rufo-testaceous, hind tibiæ and tarsi somewhat darker. ♀ antennæ shorter than the body, rather stout, filiform, 17-jointed, brown, darker towards the apex; 1st joint of the flagellum half as long again as the 2d. Cheeks partly testaceous; palpi brownish. Prothorax punctato-rugose, the sides smooth above; scutellum obtuse, more or less rugulose; mesopleuræ with a punctate furrow; metathorax short, truncate posteriorly and bidentate, the posterior face much shorter than the dorsal; rugulose, tricarinated, the 2 lateral carinæ ending in an obtuse angle. Wings infumated, narrow; radix, squamulæ, and nervures fuscous; stigma somewhat paler; 1st abscissa of the radius originating a little beyond its middle, much shorter than the intercubital nervure; anterior angle of the prædiscoidal areolet complete; radius curved at the base. Legs darker than those of the ♂. Abdomen shorter and narrower than the thorax, lanceolate above, compressed towards the apex, and, viewed laterally, clavate; 1st segment about 3 times longer than broad, scarcely widened behind, minutely striated, margined, bicarinated at the base. Terebra subarcuate, one-half longer than the abdomen. ♂ similar; antennæ as long as the body, or somewhat longer, setaceous, 20—21-jointed, the basal joints rufous beneath; legs paler; abdomen narrower. Length, 1¼; wings, 2½ lin.

Not common; Curtis appears to have taken one ♀, which Haliday described; Ruthe possessed two pairs, found near Berlin; and in my collection are 3 females, 1 male, taken in Northants, Leicestershire, and Wiltshire.

7. *Blacus paganus*, Hal.

Blacus paganus, Hal., Ent. Mag., iii., 122, ♀.
B. brevicornis, Ruthe, Berl. ent. Zeit., 1861, p. 146, ♀.
? *B. humilis*, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 95 (partly), not of Nees.

♀. Black or piceous; legs rufo-piceous; mandibles rufous; palpi piceous, the 2 last joints of the maxillary pale. Antennæ stout, moniliform, not longer than the head and thorax, not incrassated towards the apex, 17-jointed (the last joint consisting really of two united). Thorax irregularly punctulate, pubescent; pleuræ rugulose, more finely beneath the wings and in the shallow furrow;

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scutellum punctulate; metathorax short, inclined from the base to the apex, rugulose, tricarinate, quadridenticulate at the sides. Wings whitish hyaline, stigma and nervures fuscous, or ochreous, and in that case the costa and parastigma are darker; squamulæ piceous; parastigma somewhat enlarged, cutting off the angle of the prædiscoidal areolet. Legs short and stout, obscure, the fore pair palest; hind femora in the middle, their tibiæ at the apex, usually infuscated; coxæ fuscous. Abdomen as long as the thorax, compressed posteriorly, oblong above, triangular when viewed laterally; 1st segment subrectangular, twice as long as broad, somewhat constricted at the base, margined, punctate-striate, with 2 faint medial carinæ; tubercles somewhat salient before the middle; suturiform articulation visible; segments 2—3 together longer than the 1st; segment 3 faintly punctulate. Terebra decurved, the valves stout at the base, about as long as ⅓ of the abdomen.

♂. Similar; antennæ slender, filiform, longer than the body, 19—20-jointed. Parastigma smaller, not cutting off the angle of the prædiscoidal areolet. Second abdominal segment sometimes testaceous; abdomen more slender; legs much longer. Length, 1½; wings, 3 lin.

Not common; I possess a ♂ from Lastingham, Yorkshire, and a ♀ from St. Albans. They are much larger than *B. humilis*, Nees, and quite distinct; the want of specimens seems to have caused a difficulty to Ruthe, who had only one ♀. Wesmael's *humilis* is probably made up of the present species and *humilis*, Nees; but the description of the latter is so concise that there hardly remains anything to trust to except size.

8. *Blacus trivialis*, Hal.

Blacus trivialis, Hal., Ent. Mag., iii., 122, ♂ ♀.
B. instabilis, Ruthe, Berl. ent. Zeit., 1861, p. 149, ♂ ♀.

Black; mandibles rufescent; palpi pale fuscous. ♀ antennæ stout, subfiliform, about ¾ as long as the body, incrassated towards the apex, 17-jointed, the 4 ante-apical joints globose. Metathorax punctato-rugose, tricarinate, more or less obtusely bidenticulate. Wings ample, hyaline; stigma and nervures stramineous; costa, radix, and squamulæ fuscous; radius slightly curved in the middle, making the radial areolet subovate; anterior angle of the prædiscoidal areolet truncated by the enlarged parastigma. Legs slender, rufo-testaceous; hind coxæ black, their femora usually infuscated; tarsi fuscous at the apex. Abdomen longer than the

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thorax; 1st segment twice longer than broad, hardly widened posteriorly, finely margined, punctato-rugose; tubercles inconspicuous. Terebra straight, half as long as the abdomen, or somewhat less. ♂ antennæ hardly shorter than the body, subsetaceous, fuscous, 19-jointed, the basal joint rufous at the apex. Prædiscoidal areolet as in the ♀. First abdominal segment linear; anal forceps somewhat extruded. Length, 1¼; wings, 2½ lin.

Very like *humilis*, Nees, but larger and stouter, with longer antennæ; the dentiform angles of the metathorax, though short, are never quite obsolete; the radius is not quite straight, and its areolet shorter in proportion. It is, however, extremely difficult to distinguish otherwise than by the size. Gregarious, and abundant throughout the country in shady woods.

9. *Blacus aptenodytes*, n. s.

♀. Niger, prothoracis lateribus, mesonoto, scutello, rufis; abdominis segmento 8tio pedibusque cum coxis testaceis; unguiculis fuscis. Antennæ corpore paulo breviores, 18-articulatæ, rufo-testaceæ, scapo et articulo ultimo obscurioribus; flagelli articulus 1us 2o duplo longior; ultimus oblongus, acuminatus, e duobus conflatus, præcedente duplo longior. Corpus subtiliter albido pubescens; caput, mesothorax, scutellum, sicut in *B. ruficorni* formata; metathorax deplanatus, rugulosus, medio carinatus, areis dorsalibus duabus distinctis; postice fere in perpendiculum declivis, angulis fortiter productis, obtuse dentiformibus. Alæ angustissimæ (latitudine vix nisi longitudinis sextantem æquante), abbreviatæ, ciliatæ, metathoracis apicem non excedentes; stigma lineare, alæ apici propinquum, et cum nervis fusco-testaceum. Femora postica cum tibiis suis solito crassiora, subclavata. Abdomen deplanatum, apice compressum; segmentum 1um elongatum, lineare, apicis latitudine circiter triplo longius, bicarinatum, rugulosum; cætera lævissima. Terebra breviuscula, segmenti 1mi longitudinem dimidiam haud superans. Mas latet.

♀. Black; prothorax at the sides, disk of the mesothorax, and scutellum, rufous; 3d abdominal segment, and legs together with the coxæ, testaceous; claws fuscous. Antennæ rather shorter than the body, 18-jointed, rufo-testaceous, with the scape and the last joint darker; 1st joint of the flagellum twice as long as the 2d; last joint oblong, acuminate, consisting of 2 joints united, twice as long as the preceding. Body minutely and sparsely pubescent with whitish hairs; head, mesothorax, and scutellum formed as in *B. ruficornis;* metathorax deplanate, rugulose,

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carinated in the middle, with two distinct dorsal areæ; almost vertical behind, the apical angles strongly produced, obtuse, dentiform. Wings very narrow, their breadth scarcely equalling $\frac{1}{8}$ of their length, abbreviated, ciliated, not reaching beyond the metathorax; stigma linear, placed near the apex of the wing, fuscotestaceous, together with the nervures. Hind femora and tibiæ incrassated, subclavate. Abdomen deplanate, compressed at the apex; 1st segment elongate, linear, about 3 times longer than its apical breadth, bicarinated, rugulose; the other segments very smooth. Terebra short, not longer than $\frac{1}{3}$ of the 1st segment. Male unknown. Length, $1\frac{1}{4}$; wings, 1 lin.

A specimen was taken at Peckham by Billups, and two more by Capron at Shiere, near Guildford.

10. *Blacus ambulans*, Hal.

Ganychorus ambulans, Hal., Ent. Mag., iii., 43, ♀.

♀. Pitchy black; 2d abdominal segment rufescent; mouth and clypeus dull ferruginous. Antennæ 20-jointed, ferruginous, fuscous at the apex, the subapical joints somewhat shorter, and the last joint larger than in *B. ruficornis;* yet the antennæ resemble those of that species rather than of *maculipes*, and are similarly coloured. Head rotundo-cubic, less oblate than in other species. Metathorax subcubic, truncate behind, thickly granulated. Wings abbreviated, narrow, tinted with brown; stigma and nervures fuscous; radix and squamulæ stramineous. Legs shorter than in *ruficornis*, of a duller rufous; hind femora annulated with fuscous before the apex; last joint of all the tarsi and base of the hind coxæ fuscous. Abdomen shorter and more compressed; 1st segment hardly forming $\frac{1}{3}$ of its length, stouter, and with less conspicuous tubercles. Terebra as long as the abdomen. Male unknown. Length, $1\frac{1}{4}$; wings, $1\frac{3}{4}$ lin.

Var. Mesonotum and scutellum rufo-piceous.

The description is that of Haliday. Specimens were formerly in Curtis's collection, but nothing more is known of them. They are not, I think, the *Ducnusa cerealis* of Curtis, as stated in my catalogue, for some reason now forgotten; that synonym rather applies to *Blacus humilis*, Nees.

XVIII. LIOPHRONIDES.

Maxillary palpi 5-, labial 3-jointed. Mesothoracic sutures distinct or obsolete. Abdomen subsessile, oval, convex; suturiform

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articulation obsolete, the other sutures distinct; apical segments of the ♀ curved under the abdomen, so that the short terebra points forwards. Wings nearly as in the last subfamily, but the radius is curved, and its 1st abscissa much shorter than the thickness of the stigma.

The genus *Liophron* of Nees v. Esenbeck, established in 1819, indicates species with 2 cubital areolets, and the abdomen of the ♀ decurved. In his monograph (i., 43) he describes 3, which now belong to as many different genera; *L. falcatus* is a *Pygostolus*, and is referred to the *Blacides; L. clavipes*, from Italy, has the abdomen margined, and belongs to some different tribe; *L. ater* belongs to the present group. Wesmael described 4 species of *Liophron*, taking what he supposed to be the *L. ater*, Nees, for his type; the *ater*, Wesm., however, is not identical with *ater*, Nees, but with *Bracon lucidator*, Nees. The species known to Wesmael belong to two genera which Haliday named *Ancylus* and *Centistes*, but for *Ancylus* he afterwards restored the original name *Liophron*. A notice of *Liophron* and *Centistes* by Reinhard, accompanied by diagnoses of the species, is to be found in the Berl. ent. Zeit. for 1862. Förster, in his Synopsis, created some confusion by substituting the name *Liophron* for Haliday's *Centistes*, and quoting as a type *L. ater*, Nees, which is *Ancylus excrucians*, Hal.; the type should have been *L. ater*, Wesm. As for Haliday's *Liophron*, or *Ancylus*, it is divided by Förster into two new genera, *Ancylocentrus*, containing (for the second time) *Ancylus excrucians*, Hal., with the claws bifid; and *Allurus*, containing *Ancylus muricatus*, Hal., with the claws simple. The character taken from the claws is here reversed in the two genera; it is also a merely sexual distinction. Another genus of Förster's, *Syrrhizus*, remains undescribed. With the *Liophronides* terminates the series of Polymorphous groups characterised by 2 cubital areolets in conjunction with a sessile or subsessile abdomen. The perfect insects frequent fungi, but their habits in the larval state are entirely unknown.

Mesothoracic sutures distinct	.. ..	i. LIOPHRON.
Mesothoracic sutures obliterated	.. ..	ii. CENTISTES.

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i. Liophron, *Nees.*

Leiophron, Nees, Act. Ac. L. C., 1819, p. 303; Mon., i., 45; Wesm., Nouv. Mém. Ac. Brux., 1835, p. 103.

Ancylus, Hal., Ent. Mag., i., 459 and 460.

Mesothoracic sutures distinct, only in one species vanishing posteriorly. Abdomen subsessile, convex; terebra short, curved, with broad cultrate valves, pointing forwards. Wings with 2 cubital areolets; podiscoidal areolet narrowly open at the apex.

Joints of the antennæ cylindric, and closely conjoined. Abdomen above ellipsoid; 1st segment short, tubercles placed near the base; segments 2—3 together much longer than the 1st, smooth and shining; the following segments short, but not concealed; anus of the ♀ compressed, decurved. Stigma ovate, lanceolate; prædiscoidal areolet not quite touching the parastigma; 1st cubital areolet separated from the prædiscoidal; recurrent nervure interstitial; cubital nervure faintly traced. The antennæ and legs offer no sexual peculiarities as in the *Blacides*. The species are of rare occurrence, black and very shining, with hard integuments; the 2d abdominal segment is sometimes more or less red. We have four species:—

(6)	1. First abdominal segment subquadrate, not narrowed at the base; claws of the ♀ bifid, of the ♂ simple.	
(5)	2. Abdomen partly red.	
(4)	3. Hind coxæ produced into a strong tooth; ventral segments bidenticulate on their hinder edge; 2d abdominal segment entirely, 3d at the sides and beneath, red ..	1. *muricatus*, Hal.
(3)	4. Hind coxæ only subdentate; ventral segments hardly bidenticulate; abdomen wholly black above, dull red at the sides	2. *lituratus*, Hal.
(2)	5. Abdomen entirely black	*muricatus*, var.
(1)	6. First abdominal segment longer than broad, narrowed at the base; claws simple, ♂ ♀.	
(8)	7. Tubercles of 1st segment not salient: coxæ red, or at most with a fuscous basal spot above	3. *ater*, Nees.
(7)	8. Tubercles salient; coxæ black	4. *edentatus*, Hal.

1. *Liophron muricatus*, Hal.

Ancylus muricatus, Hal., Ent. Mag., ii., 460; Reinh., Berl. ent. Zeit., 1862, p. 335, ♀.

Leiophron armatus, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 105, ♀ (not var. 1).

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♀. Black, shining; legs and 2d abdominal segment rufous. Body pubescent, on the under side rather thickly. Mandibles, and sometimes clypeus, rufescent. Antennæ more or less rufous at the base, somewhat longer than the body, 30—31-jointed. Metathorax convex, finely rugulose, dull, with an indeterminate smooth space on each side of the base. Wings hyaline, stigma fuscous, nervures paler, radix and squamulæ dull stramineous. Legs elongate, stout; base of hind coxæ, hind tibiæ at the tips, and their tarsi, infuscated; hind coxæ armed underneath with a vertical and somewhat obtuse tooth; hind tarsi the longest; claws bifid. First abdominal segment subquadrate or hardly longer than broad, with a transverse impression on each side before the middle, dilated at the base where the salient tubercles are situated, longitudinally rugulose, especially towards the sides, the extremity smooth in the middle; 2d segment rufous, with or without a medial fuscous spot on the disk; 3d segment black, rufous at the sides and underneath, its ventral hind margin bidenticulate; the same denticulation is repeated more and more faintly on the following ventral segments. Terebra very short; valves ferruginous, pilose, rounded, squamiform. Male unknown. Length, 1—1⅔; wings, 1¼—3 lin.

Var. Abdomen entirely black. Wesmael.

This species only differs from the following in the more pronounced denticulation of the coxæ and ventral segments, and in the distribution of the rufescence of the abdomen; it is therefore not unlikely that they belong to the same species, as Wesmael supposed, and that the species is moderately variable. Found rarely, in woods; I possess 2 females, one taken in the Forest Hills, Leicestershire, the other in Brittany, near Lokmariaker.

2. *Liophron lituratus*, Hal.

Ancylus lituratus, Hal., Ent. Mag., ii., 461, ♀.
Leiophron lituratus, Reinh., Berl. ent. Zeit., 1862, p. 335, ♂ ♀.
L. armatus, var. 1, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 105, ♀.

Only distinguished from the preceding as follows:—In general larger, the red portions of a duller hue; antennæ 31—33-jointed; abdomen longer and more slender; 2d segment black or piceous above; sides of all the segments, and the entire belly, rufous; denticulation of the ventral segments and hind coxæ less distinct. The ♂ (which I have not seen) differs, according to Reinhard, in

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having the claws simple; antennæ 33-jointed; abdomen not decurved at the extremity. Length, 2; wings, 3¾ lin.

I have 3 old ♀ specimens taken at Milford Haven, of larger size, with 33-jointed antennæ; and one from Nunton, Wilts, which is rather smaller; antennæ 31-jointed. This last closely resembles *muricatus*.

3. *Liophron ater*, Nees.

Leiophron ater, Nees, Mon., i., 45; Reinh., Berl. ent. Zeit., 1862, p. 335, ♂ ♀ (not of Wesm.)
Ancylus ater, Hal., Ent. Mag., iii., 21, ♂ ♀.
A. excrucians, Hal., Ent. Mag., ii., 461, ♀.

♀. Smaller than the two foregoing species; abdomen entirely black. Antennæ 24—25-jointed, scarcely longer than the body, more or less rufous beneath at the base. Mouth rufo-testaceous; palpi paler. Wings as in *muricatus*. Legs rufo-testaceous; hind coxæ edentate, more or less fuscous above; claws fuscous, not bifid. First abdominal segment longer than broad, gradually widened from the base, which is little more than half as broad as the apex; finely aciculated; the other segments smooth and shining; tubercles inconspicuous; ventral segments denticulate. Terebra very short, curved, its valves testaceous. ♂ similar; abdomen narrower; antennæ longer, according to Nees 25- (*i. e.*, 24-) jointed. Length, 1½; wings, 3 lin.

Haliday himself (Ent. Mag., iii., 21) established the above synonymy, and he is followed by Reinhard. I shall not venture to disturb this; yet I have a difficulty in explaining the fact that Nees, in describing the thorax of his *ater*, calls it "æqualis," which is his usual mode of indicating the absence of the mesothoracic sutures. This is a character of *Centistes*, and of *Bracon lucidator*, Nees, the *L. ater* of Wesmael, who seems to have taken note of the word "æqualis." It is possible then that *Bracon lucidator*, Nees = *L. ater*, Nees and Wesmael, = *Centistes;* and in this case the name of the species above described should be *L. excrucians*, Hal.

Found among fungi in woods, but not common; I possess 4 females, one taken near St. Albans, and three at Nunton, Wilts. Nees captured the ♂ ♀ *in copulâ*, in a garden at Sickershausen, in Franconia.

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4. *Liophron edentatus*, Hal.

Ancylus edentatus, Hal., Ent. Mag., ii., 461, ♀; *Leiophron edentatus*, Reinh., Berl. ent. Zeit., 1862, p. 335, ♀.

♀. Black; more robust than the preceding. Antennæ 26-jointed, dull ferruginous at the base beneath. Mandibles flavo-rufous, fuscous at the tips; palpi paler. Wings dull hyaline, stigma and nervures fuscous, radix stramineous, squamulæ piceous; radial areolet very little widened at the base, attenuated at the apex, making a distant approach to the semicordate form of *Sigalphus*. Legs flavo-rufous; coxæ black, unarmed; tarsi fuscous, except at the base. Abdomen subdepressed: 1st segment aciculated, stouter than in *L. ater*, Nees, attenuated at the base, but its width across the large and prominent tubercles is nearly equal to that of the apex; belly flattened, its segments edentate. Haliday. ♂ similar; antennæ not longer than the body, in my specimen 25-jointed. Mesothoracic sutures shallow, posteriorly effaced. Metathorax short, subrugulose, somewhat shining. Four posterior femora with a fuscous line above; hind tibiæ somewhat infuscated at the apex. Radial areolet as in the ♀. An intermediate form, leading to *Centistes*. Length, 1¼; wings, 8 lin.

The ♀ seems not to have occurred since the time of Haliday, who drew up his diagnosis from 2 old and bad specimens; he remarks that their depressed abdomen might be the result of rough handling. The ♂ I captured at Nunton, and refer it to this species with some confidence, owing to the form of the radial areolet.

ii. Centistes, *Hal.*

Centistes, Hal., Ent. Mag., ii., 462; Reinh., Berl. ent. Zeit., 1862, p. 336.

Characters of *Liophron*, but the mesothorax is quite smooth, with no trace of sutures. Antennæ having the same number of joints in both sexes. Abdomen obovate, convex in the ♀, decurved at the apex, and with the belly compressed; subdepressed in the ♂; 1st segment longer than broad, narrowed at the base; tubercles inconspicuous. Terebra short, subulate, pointing forwards.

Only two species are known in Europe:—

Legs flavo-rufous; antennæ 24-jointed, as long as the body, or longer .. .. 1. *lucidator*, Nees.

Legs brown; antennæ 19-jointed, shorter than the body .. .. 2. *fuscipes*, Nees.

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1. *Centistes lucidator*, Nees.

Bracon lucidator, Nees, Mon., i., 50, ♂.
Centistes cuspidatus, Hal., Ent. Mag., ii., 462, ♂ ♀.
Leiophron ater, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 104, ♂ ♀ (not of Nees).

♀. Black, brilliant; mandibles and sometimes the clypeus testaceous; palpi paler. Two or three basal joints of the antennæ testaceous beneath. Face carinated in the middle. Mesonotum smooth and brilliant, gibbous. Metathorax slightly rugulose, with a shining space on each side at the base, and another at the apex. Wings hyaline, stigma and nervures reddish fuscous, radix and squamulæ dull stramineous. Legs testaceous; hind tibiæ towards the apex, and their tarsi, fuscescent. First abdominal segment aciculated, with 2 lateral carinæ, and a third in the middle which reaches neither extremity; the following segments very smooth and shining. Terebra as long as the 1st segment, but concealed in repose; its valves black, acute, lanceolate. The ♂ differs only in having longer antennæ, and the abdomen not decurved at the extremity. Length, 1—1¼; wings, 2—2¾ lin.

The ♂ is common everywhere, and especially amongst fungi in woods; the ♀ is seldom met with.

2. *Centistes fuscipes*, Nees.

Bracon fuscipes, Nees, Mon., i., 50; *Leiophron fuscipes*, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 107, ♀; *C. fuscipes*, Reinh., Berl. ent. Zeit., 1862, p. 336, ♂ ♀.

Shorter and stouter than the preceding. Black, shining; mandibles rufous; palpi piceous. Antennæ ♀ entirely fuscous, stout, filiform, about half as long as the body. Mesonotum smooth, gibbous. Metathorax slightly rugulose, transversely bisected by a carina more or less distinct. Wings shorter than in *lucidator*, somewhat infuscated, nervures and stigma fuscous or rufescent, the latter short, broad, triangular. Legs stout, brownish, fore femora and tibiæ sometimes rufescent, the 4 posterior always dark coloured; knees somewhat paler; joints of the tarsi short. Abdomen oblong-ovate; 1st segment broader than in *lucidator*, rimulose, the apex smoother in the middle; belly of the ♀ compressed. Terebra as long as ¼ of the abdomen, but concealed in repose; valves black, subcylindric, rounded at the end. The ♂ is similar, with the usual sexual differences. Length, 1; wings, 2 lin.

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Not common; I captured several of both sexes once in Leicestershire, and a single specimen at Nunton.

XIX. ICHNEUTIDES.

Maxillary palpi 5-, labial 4-jointed. Mesothoracic sutures distinct. Abdomen sessile, depressed, subclavate or spathuliform, showing 7—8 segments above. Fore wings with 3 cubital areolets, the 1st receiving the recurrent nervure; 2d small, trapeziform, about the size of the stigma (*Ichneutes*), or smaller (*Proterops*); radial areolet very short, subtriangular, metacarpus not longer than the stigma; pobrachial areolet of the hind wings half as long as the præbrachial. Terebra concealed, or nearly so.

The group is of very small extent, and completely isolated; the shape of the radial areolet at once distinguishes the insects; it resembles in some degree that of *Chelonus*, but there the likeness stops. Wesmael also compares his genus *Acampsis* (a section of *Sphæropyx*), but the similarity extends no further than the head and thorax. Nees v. Esenbeck was acquainted with a single species, for which he established the genus *Ichneutes*; Wesmael added two more, one of which he afterwards suppressed, and made known a second genus *Proterops*, with one species, perhaps described by Fabricius as a *Bracon*, but subsequently neglected or misunderstood. The insects are sluggish, and attack the exposed larvæ of *Tenthredinidæ*, for which purpose they do not require a long terebra.

First abscissa of the radius much shorter than the 2d; 2d cubital areolet broader than long, its upper side much longer than the 2d transverso-cubical nervure; radius of the hind wings obsolete; front of the usual length, so that the foremost ocellus is remote from the base of the antennæ .. .. i. ICHNEUTES.

First abscissa of the radius longer than the 2d; 2d cubital areolet longer than broad, its upper side shorter than the 2d transverso-cubical nervure; radius of the hind wings distinct; front so abbreviated that the foremost ocellus is situated between the antennæ .. .. ii. PROTEROPS.

i. ICHNEUTES, *Nees.*

Nees, Mag. Ges. Berl., 1816, p. 275; Mon., i., 156; Wesm., Nouv. Mém. Ac. Brux., 1835, p. 195.

Head transverse, as wide as the thorax; occiput not margined; face quadrate; clypeus rounded behind, straight on the front edge,

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deplanate; mandibles broad, bidentate. Antennæ setiform, those of the ♂ hardly longer. Thorax short; mesonotum elevated. Wings ample, hyaline; podiscoidal areolet almost as large as the prædiscoidal; the short triangular radial areolet remote from the apex of the wing; in the hind wings the radial and cubital areolets are not separated. Legs short, stout; hind tibiæ subclavate, armed with very short spurs. Terebra not projecting beyond the last segment; anus of the ♂ obtuse, segment 6 much longer than 5, rounded behind, smooth and concave above; the ♂ is also smaller and narrower than the ♀, but not otherwise distinguishable. Of the two known species *I. levis* has not yet been noticed in this country.

1. *Ichneutes reunitor*, Nees.

Ichneutes reunitor, Nees, Mag. Ges. Berl., 1816, p. 276, pl. vii., f. 3; Mon., i., 158; Wesm., Nouv. Mém. Ac. Brux., 1835, p. 196, ♂ ♀; S. v. Voll. Schets., tab. v.

I. brevis, Wesm., *lib. cit.*, p. 198, ♂ ♀; *cf.* Suppl., p. 156; Ratz., Ichn. d. Forst., ii., 70, pl. ii., f. 35.

Black, abdomen sometimes piceous in the middle. Body somewhat villose. Face rugulose, beset with greyish pubescence, and with a short indistinct carina above. Cheeks, vertex, and front granulated, dull; palpi and middle of mandibles testaceous. Antennæ ♂ ♀ as long as the body, 31-jointed. Thorax pubescent; pleuræ granulated; metathorax subrugulose, with an oblong medial area enclosed between two carinæ which reach from the base to the apex. Stigma and nervures fuscous; radius slightly curved; 2d intercubital nervure very short, subobsolete; hind wings sinuated near the base of their anterior margin; their pobrachial areolet remote from the posterior margin. Legs pale rufo-testaceous; coxæ black. Abdomen pubescent; 1st segment rugose, dull, with 2 carinæ, separated at the base and converging to the apex; 2d segment rugose; 3d and following sparingly punctulate, shining. Valves of the terebra conical. Length, 1½—2½; wings, 3—5 lin.

Var. 1. Antennæ, abdomen in the middle, and coxæ, testaceous; or antennæ with a fuscous line above, and hind coxæ partly fuscous.

Var. 2. Smaller; facial carina more distinct; metathorax with no medial area; radius straight; pleuræ almost smooth; palpi dusky; hind femora piceous on the outer side. *I. brevis*, Wesm.

Not common, but widely distributed, from the Arctic

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regions to the Mediterranean; the Rev. A. E. Eaton brought a specimen from Spitzbergen, and others were sent to me from Italy by Dr. Magretti. According to Ratzeburg both sexes were bred in April from galls of *Nematus viminalis*, L., on willows, by Hartig; also by Brischke from (probably) *Nematus septentrionalis*, L.; it is also mentioned as a parasite of *Nematus frigidus*, Boh., and *Nematus salicis*, L. I have several times taken it in England on umbellate flowers, and at Nunton a specimen occurred belonging to var. 1.

ii. Proterops, *Wesm.*

Wesm., Nouv. Mém. Ac. Brux., 1835, p. 201.

Characters of *Ichneutes;* but the anterior ocellus is placed between the antennæ, the front thus almost disappearing; the 2d cubital areolet is much smaller, contracted above; the radius of the hind wings distinct, &c., as already pointed out. The insect is much larger, with blackish wings and orange-coloured abdomen, like a *Bracon*, for one of which genus it was formerly mistaken.

1. *Proterops nigripennis*, Wesm.

Bracon denigrator, Cur., B. E., pl. lxix., ♂ (exclusive of dissections and text); not of Fab.

Proterops nigripennis, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 202, ♂ ♀; also Suite I., 1837, pl. f. P; S. v. Voll. Schets., tab. v.

Black, shining, pubescent; wings dark brown; abdomen bright orange. Face impressed with a deep fovea on each side of the clypeus; palpi and mandibles black. Antennæ ¼ longer than the body, stout, slightly incrassated towards the apex, 34-jointed in one ♂ (I have no ♀). Mesothoracic sutures deeply incised, impunctate. Metathorax short, rugulose, dull. Wings iridescent, with a whitish streak below the stigma, which is black, as well as the nervures; hind wings sinuated near the base. Legs entirely black, pubescent, longer than those of *Ichneutes*, and the spurs of the hind tibiæ longer. Abdomen smooth, shining, punctulate, pubescent with reddish hairs; showing 8 segments above in the ♂, 7 in the ♀; 1st segment widened from the base to the apex, where its breadth is doubled; posterior margin deeply sinuated; disk convex, with raised margins separated from the medial ridge by a channel on each side; tubercles basal, salient; sutuviform articulation uncommonly deep, impunctate; abdomen widened to the

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end of the 4th segment; 5th and 6th narrower; 7th in the ♀ protruding only as a blunt point; 7th segment of the ♂ rounded, and followed by the exserted apex of the 8th. Terebra concealed. ♂ ♀. Length, 2¾; wings, 6 lin.

Very rare in this country; a parasite of *Hylotoma enodis*, L. Wesmael possessed 4 specimens taken near Brussels; Magretti has found it in Italy, at Canonica d'Adda; Curtis records a ♂ captured in Birch Wood, Kent, and a ♀ taken by Kirby, now in the Stephensian collection; Cameron has obtained more than one in Scotland, and the ♂ I possess is due to his liberality.

XX. HELCONTIDES.

Maxillary palpi 6-, labial 4-jointed. Front excavated, usually armed with an erect tooth; head large, subconic, transverse. Abdomen sessile or subsessile, articulated to the posterior face of the metathorax near its upper edge, and much above the hind coxæ; 1st segment usually elongate, forming even as much as half the abdomen; but not so in *Cenocœlius*. Fore wings with 3 cubital areolets; recurrent nervure rejected or interstitial; 2d cubital areolet trapeziform; radial areolet lanceolate, acute, ending before the apex of the wing; metacarpus longer than the stigma; prædiscoidal areolet contiguous or petiolated. Hind femora incrassated, in *Helcon* often toothed beneath. Terebra elongate.

The species are parasites of Coleoptera.

The two genera to be here noticed are only distantly related; yet it is better perhaps to keep them together for the present.

Abdomen sublinear, elongate; 1st segment forming nearly half of its length; anterior margin of the clypeus unarmed; recurrent nervure considerably rejected	i. HELCON.
Abdomen elliptic, short; 1st segment scarcely forming a third of its length; anterior margin of the clypeus dentate; recurrent nervure interstitial, or nearly so	ii. CENOCŒLIUS.

i. HELCON, *Nees.*

Nees, Act. Ac. L. C., 1819, p. 307; Mon., i., 224.

Occiput margined. Mesothoracic sutures distinct, rugose. Prædiscoidal areolet almost touching the parastigma. Abdomen as

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long as the thorax, linear, sometimes incrassated and rounded posteriorly, sessile.

Head large, subcubic, as wide as the thorax; face convex, variolose; clypeus short, discrete, its front edge straight, 2 basal foveæ distinct; eyes small, protuberant; cheeks not dilated. Antennæ placed at the edge of the large frontal depression, in both sexes as long as the body, or longer. Prothorax produced, variolosely punctate, its lateral margins elevated. Mesothoracic lobes very convex, the medial one produced towards the head. Metathorax truncated posteriorly, areated by 4—6 carinæ. Wings rather small; stigma narrow, lanceolate; 1st cubital areolet receiving the recurrent nervure a little behind the middle; 2d small, hardly longer than broad; pobrachial areolet somewhat longer than the præbrachial, sometimes emitting a spurious nervure from its extremity to the hind margin (but not in *H. annulicornis*); podiscoidal areolet completely closed; radial areolet of the hind wings contiguous or petiolated; anal nervure distinct. Legs elongate, especially the hind pair; coxæ and hind femora incrassated, the latter often dentate beneath; tibiæ stout, but with small spurs; tarsi elongate. Abdomen narrower than the thorax, deplanate; 1st segment very long, bicarinated; 2d and 3d together a little shorter; the others transverse.

The large black species of *Helcon* are found in the forests of Central Europe, usually on the trunks of trees, or felled timber, where the females crawl slowly in search of the burrows of longicorn beetles. Kawall, in Courland, bred *H. ruspator*, L., from a larva of *Strangalia quadrifasciata*, L. It is almost certain that Great Britain possesses no indigenous species, and that the occurrence of the following in some numbers on one occasion was the result of their accidental introduction.

1. *Helcon annulicornis*, Nees.

Nees, Mon., i., 231; Ste., Ill. M., vii., Suppl. 4, pl. xxxvii., f. 3 ♂, f. 4 ♀; Hal., Ent. Mag., iii., 144, ♂ ♀.

Deep black, very shining; legs red; 4 anterior coxæ and trochanters, hind tibiæ and tarsi, black; antennæ of the ♀, and 4 posterior tarsi in both sexes, annulated with white; hind femora armed beneath with a stout subapical tooth. Face rugose; vertex deplanate, transverse, smooth. Antennæ ♀ 29-jointed, black; joints 13—15 white. Mandibles and palpi fuscous. Thorax punctate, with blackish pubescence. Metathorax reticulated, with

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4 longitudinal carinæ, of which the two medial form an elongate area, narrowest at the base; the lateral carinæ are twice intersected by transverse carinæ. Wings fumato-hyaline; stigma and nervures fuscous. Hind coxæ rufous; fore femora and 4 anterior tibiæ fuscous at the base; fore tarsi rufous, fuscous at the tips; the other tarsi white, with the base of the 1st joint and the last joint entirely, fuscous. First abdominal segment longer than the 2d and 3d together, scarcely widened posteriorly, with raised lateral margins and 2 parallel dorsal carinæ, the space between which is punctulate and rugose; the 2 exterior channels smooth, as likewise is the rest of the abdomen. Terebra as long as the abdomen and metathorax. ♂ much smaller; antennæ without a white ring; abdomen narrower. Length ♀ 5; wings, 9 lines; ♂ 4; wings, 7½ lines.

Taken in Germany by Gravenhorst, in France by Villers, near Lyon. The pair excellently figured in the work of Stephens are from several found, as that author believed, in South Wales; more were in the collection of the Entomological Club, supposed to have been taken by E. Newman near Leominster. A ♀, the gift of F. Walker, is in my collection, and I presume it was one of the same casual visitors. They might have been imported in the larval state to Bristol or Cardiff in foreign timber containing Coleoptera; it is certain that no more specimens have since appeared in this country. I possess also *H.* (*Gymnoscelis*) *tardator*, Nees, from Walker's collection, but its British origin is altogether doubtful.

ii. Cenocœlius, *Hal.*

Cenocœlius, Hal., in Westw. Int., ii., Gen. Syn,, 62; Brullé in St. Farg. Hym., iv., 481; Westw., Tijdschr., 1881—82, p. 33; Smith, Nom. Brit. Hym., pt. xiii., p. 27, and Proc. Lin. Soc., Zool., vi., p. 66; S. v. Voll. Schets., tab. vi., f. 24 (wings by Haliday).

Capitonius, Brullé in St. Farg. Hym., iv., 544.

Aulacodus, Cresson, Proc. Ent. Soc. Philadelph., 1865, p. 8.

Laccophrys, Först., Verh. d. pr. Rheinl., 1862, p. 257; Reinh., Berl. ent. Zeit., 1865, p. 265.

Occiput margined. Mesothoracic sutures distinct, punctate. Prædiscoidal areolet petiolated, not touching the parastigma.

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Abdomen not longer than the head and thorax, subsessile. Terebra exserted.

Head very large, transverse, broader than the thorax; face convex; clypeus angulated in front, imperfectly discrete, with 2 indistinct basal foveæ; eyes small; cheeks somewhat dilated; antennæ inserted in a large shallow depression of the front; between them is a compressed dentiform elevation; those of the ♂ as long as the body, of the ♀ hardly longer than the head and thorax. Mesopleuræ punctulate, shining, with a crenate furrow. Metathorax depressed, vertical behind. Second cubital areolet, when measured along the cubital nervure, twice as wide as when measured on the radial; its inner angle incomplete. Legs short, stout; hind femora edentate. First abdominal segment subtriangular, striated, the rest smooth; 2d and 3d segments of equal length; suturiform articulation visible.

The genus *Cenocœlius* was established by Haliday from a British insect which he named *flavifrons* but did not describe; he left, however, a sketch of the wings, reproduced in Van Vollenhoven's 'Schetsen.' Certain exotic insects were recognised by F. Smith and Professor Westwood as nearly allied, and the name *Cenocœlius* was applied to them, while the British type of the genus remained unknown, or received new names from authors whenever it occurred. The first description of Haliday's insect is that by Nees v. Esenbeck, who placed it in the genus *Bracon;* in Ratzeburg's work it figures as an *Opius*, and is accompanied by a second congener; Förster created for them his genus *Laccophrys*, subsequently adopted by Reinhard, Van Vollenhoven, and others. The second species mentioned by Ratzeburg was known long ago to Linné, and is ticketed in the Linnean collection as *Ichneumon agricolator* and *secalis*. As there can be no doubt that the insect now to be described is Haliday's type of *Cenocœlius*, I have restored the proper generic name, leaving the exotic forms to whatever fate may be in store for them; one or other of the names *Capitonius* or *Aulacodus* may perhaps be conveniently applied to them, and their differences from the British *Cenocœlius* may be hereafter settled. There seems to be a natural group of some extent to which these insects belong; some are Asiatic and others American; they are sufficiently different from *Helcon*, and no doubt require generic division, though agreeing in the mode in which the abdomen is articulated to the

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metathorax. This position of the abdomen tends to break down the distinction between the *Braconidæ* and *Evaniidæ*, and seems to have influenced the respective authors of *Capitonius* and *Aulacodus*, who have arranged those genera in the latter family. The wings and general appearance of *Cenocœlius* are those of a Braconid, whatever difficulty may exist in determining its exact location; Förster referred *Laccophrys* to the *Diospilides*, and Reinhard to the *Helcontides*; the second arrangement is somewhat preferable, but in fact *Cenocœlius* is isolated, and the connecting-links, if any, which might determine its position, must be looked for out of Europe. *Laccophrys Villæ-novæ* and *L. Medenbachii*, Voll., seem hardly to belong to this genus.

1. *Cenocœlius analis*, Nees.

Bracon analis, Nees, Mon., i., 63, ♂ ♀.
Opius cephalotes, Ratz., Ichn. d. Forst., ii., 63, ♂ ♀ (not of Wesm.).
Laccophrys cephalotes, Reinh., Berl. ent. Zeit., 1865, p. 267, pl. iii., f. 6, ♂ ♀.

Black; mouth, femora towards the apex, tibiæ, and tarsi rufous, as also the face, cheeks, and 4th and following abdominal segments of the ♀. Antennæ 25-jointed, blackish, the extreme base rufous. Palpi fuscous. Metathorax coarsely rugose, reticulated. Wings fusco-hyaline, stigma and nervures fuscous; beneath the former is an indistinct pale streak. Legs rufous; coxæ and basal half of the femora more or less black. First abdominal segment deeply striated, 3 times broader at the apex than at the base, with basal tubercles; 2 of the medial striæ elevated, cariniform; 2d segment striated at the base, but often smooth, like all the following segments. Terebra somewhat longer than the abdomen. ♂. Antennæ as long as the body, the 3 first joints rufous. Sometimes the posterior margin of the 2d segment, and all the following segments, are dull rufous, as in the ♀. Femora not always black at the base. Length, 1½—1¾; wings, 3—3½ lin.

Reared at Hohenheim by Nördlinger from branches of apple-trees tenanted by xylophagous beetles; by Bouché from *Scolytus rugulosus*, Ratz, also on an apple-tree; the *Scolytus*, like its parasite, has the body red at the extremity. In my collection are 2 females, one from an unknown source, the other taken in the orchard of my house at Nunton.

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The second known species, *C. rubriceps*, Ratz., is likely also to be found in England. It differs in being rather larger; antennæ 31—34-jointed; head of the ♀ rufous, with a black stemmaticum. Several times reared from *Magdalinus violaceus*, L., on pine-trees. This is the true

$$Ichneumon\ \frac{agricolator}{secalis}$$

as labelled in the Linnean collection, and not the *Perilitus secalis*, Hal.; see Trans. Ent. Soc. Lond., 1887, p. 79. The meaning of the double name is hard to understand; perhaps *agricolator* and *secalis* were afterwards found by Linné to be the same, for in Turton's translation of the 'Systema Naturæ' *agricolator* is thus mentioned:—"Black; head ferruginous; abdomen sessile. Inhabits Europe. Probably a variety of *Ichneumon secalis*." The habitat of *secalis*, in the 12th ed. of the 'Systema Naturæ,' is said to be "in larvis spicarum," in larvæ found on ears of corn, which is not unlikely, although different from the origin assigned to Ratzeburg's insect.

XXI. MACROCENTRIDES.

Form elongate, slender. Head very transverse; front not or hardly excavated; foremost ocellus not placed in a fovea; antennæ elongate; maxillary palpi 6-, labial 4-jointed. Mesothoracic sutures distinct. Metathorax deplanate. Fore wings with 3 cubital areolets, the 1st separated from the prædiscoidal; radial areolet elongate, cultrate; metacarpus longer than the stigma. Abdomen longer than the thorax, sessile, linear, or subsessile, and then attenuated at the base; the segments discrete; tubercles basal. Legs elongate, slender; hind femora not incrassated; spurs of the posterior tibiæ elongate. Terebra elongate.

The first attempt to discriminate these insects from *Bracon* is due to Curtis, who in 1832 proposed the genus *Zele* (but in such terms as partially to include *Meteorus*, Hal.), and in the following year *Macrocentrus*. Nees v. Esenbeck, in 1834, included the same insects in the 1st section of his genus *Rhogas* (Mon., i., 200). Wesmael, in 1835, again separated the 2 forms united by Nees, giving to one of them (*Zele*) the name *Phylax*, which is preoccupied in Coleoptera; and to the other (*Macrocentrus*) the name *Rhogas*, in a limited sense, the genuine Rhogades being called by him *Aleiodes*. The two forms

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are well distinguished by nature; it remains only to eliminate their names from the confusion of synonymy, which is best effected by adopting the two genera *Macrocentrus* and *Zele*. The former involves no difficulty, but *Zele*, Curt., could not be accepted without its further interpretation by Haliday. Two more genera have been proposed by Förster, *Homolobus*, a dismemberment of *Zele*, and *Amicroplus*, a dismemberment of *Macrocentrus*, but they are founded upon extremely trivial distinctions.

Occiput not margined; middle lobe of the mesonotum gibbous; abdomen linear above, 1st segment not or hardly longer than the 2d; terebra straight, at least as long as the abdomen, usually much longer .. .. i. MACROCENTRUS.

Occiput margined; middle lobe of the mesonotum not more elevated than the 2 lateral; abdomen subclavate above, 1st segment much the longest; terebra falcate, much shorter than the abdomen ii. ZELE.

i. MACROCENTRUS, *Curt.*

Curt., Ent. Mag., i., 187 (1833); Hal., *lib. cit.*, iii., 136.

Rogas, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 170.

Head three times as broad as long; vertex narrow, elevated into a transverse ridge. Radial nervure of the hind wings not sinuated; radial areolet never geminated by a transverse nervure. Spurs of hind tibiæ not half as long as the metatarsus. Second abdominal segment canaliculated along the lateral margins.

Head as broad as the thorax, very oblate; occiput emarginate above; vertex transversely compressed, with a raised stemmaticum on its hinder edge; front abruptly descending; face broad, flattened; clypeus discrete, transverse, with a fovea on each side of the base; mandibles acutely bidentate. Antennæ slender, setaceous, usually longer than the body, with 30—54 joints. Thorax oblong, somewhat compressed; mesothoracic lobes gibbous, especially the middle one; metathorax short, subtruncate. Stigma ovate, protuberant outside the costa; radial areolet lanceolate, ending not far from the apex of the wing; 1st cubital areolet receiving the recurrent nervure beyond the middle; 2d small, oblong, its hinder basal angle produced; radius of the hind wings with a short petiole; pobrachial areolet longer than half the præbrachial. Legs elongate; 2d joint of trochanters sometimes ending in a minute spine on the outer side. Abdomen longer and narrower than the thorax, linear, deplanate, compressed at the

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apex in the ♀; 8 segments visible above; 1st linear, elongate, with basal tubercles; 2d and 3d a little shorter; the rest transverse; belly carinated; anus ♀ truncated; ventral valve produced, obtus-angular. Terebra longer than the body, seldom shorter.

The species are black, with or without rufous or testaceous markings; but *M. abdominalis* is often wholly testaceous. The general form much resembles that of *Lissonota* and *Glypta* among the Ichneumons. The *Macrocentri* are parasites of Lepidoptera, and often gregarious in large numbers; one species has been reared from *Anobium*. The habits of three species are noticed by Ratzeburg, and he has mentioned seven more supposed to be different; but their descriptions are incomplete, and some of them may be mere varieties. Brischke found the larvæ of *M. interstitialis*, Ratz., in small colonies between leaves of *Pyrus aria* (White Beam-tree). Some individuals retired from the rest, and made their cocoons separately. It is not stated what insect had been their victim. On the 22d of July these larvæ were 2½ lines long, white, with a green intestinal canal; on the 8th of August the perfect insects appeared. The cocoons are narrow and elongate, brown, silky, and when agglomerated together they are covered with a whitish web common to the whole brood; but the solitary cocoons are not so protected.

Table of Species.

(6) 1. Antennæ 45—54-jointed; maxillary palpi elongate, 3d joint as long as the 1st of the flagellum, or longer.

(3) 2. Third abdominal segment (like the 2 preceding) entirely rimulose .. .. .. 1. *abdominalis*, Fab.

(2) 3. Third abdominal segment rimulose at the base only, or entirely smooth.

(5) 4. Thorax black; stigma fuscous .. .. 2. *marginator*, Nees.

(4) 5. Thorax rufous; stigma yellow .. .. 3. *thoracicus*, Nees.

(1) 6. Antennæ 30—37-jointed; maxillary palpi short, 3d joint shorter than the 1st of the flagellum.

(8) 7. Second abscissa of the radius as long as the 1st intercubital nervure; legs short, stout; mesonotum ♀ black; terebra longer than the body .. .. 4. *infirmus*, Nees.

(7) 8. Second abscissa of the radius much shorter than the 1st intercubital nervure; legs elongate, slender; mesonotum ♀ rufous; terebra not longer than the abdomen .. .. 5. *collaris*, Spin.

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1. *Macrocentrus abdominalis*, Fab.

Ichneumon abdominalis, Fab., E. S., ii., 188; *Cryptus abdominalis*, Fab., Piez., 89; Grav., Ichn. Eur., iii., 1073, ♀.

Bracon linearis, Nees, Mag. Ges. Berl., 1811, p. 13, pl. i., f. 1; *Rogas linearis*, Nees, Mon., i., 200; Wesm., Nouv. Mém. Ac. Brux., 1835, p. 173, and 1838, p. 150; Ratz., Ichn. d. Forst., ii., 64, pl. ii., f. 33; *M. linearis*, Hal., Ent. Mag., iii., 137, ♂ ♀.

Rogas pallipes, Nees, Mon., i., 203; *M. pallipes*, Hal., Ent. Mag., iii., 137, note, ♀.

Elongate, slender, pubescent. Head, base of antennæ, prothorax, belly, and legs flavo-testaceous; stemmaticum fuscous; the rest variable; usually there is a dark transverse line below the scutellum, and a fuscous shade towards the extremity of the metathorax. Antennæ ♂ ♀ much longer than the body, about 45-jointed. Metathorax thickly punctulate. Wings hyaline; stigma yellow, often with a fuscous spot, or wholly fuscescent; nervures fuscescent; radix and squamulæ stramineous; 2d cubital areolet not much narrowed outwardly. Legs elongate, slender. Abdomen linear, not falcate; segments 1—3 delicately striolate, not shining; 1st segment canaliculated; 2d margined; 2—3 narrowly smooth at the apex. Terebra longer than the body. ♂ similar; antennæ almost twice as long as the body. Length, 1¾—2½; wings, 3¼—4½ lin.

Var. *α*. Piceous, head testaceous; antennæ fuscous, pale at the extreme base; prothorax and belly testaceous; pleuræ and mesonotum more or less varied with testaceous.

Var. *β*. Testaceous; metathorax partly, and base of abdomen, fuscous; or abdomen fuscous, the segments margined with testaceous; stigma with hardly a fuscous spot.

Var. *γ*. Entirely testaceous, except the stemmaticum; stigma yellow, immaculate.

Var. *δ*. Blackish; palpi, 1st joint of antennæ, legs, and base of the belly, testaceous; intermediate segments testaceous at the sides. *M. pallipes*, Nees. Van Vollenhoven bred this variety, mixed with typical specimens, from the same victim, thus proving their identity: and of 60 specimens sent to me by Bignell, about one-half were *pallipes*.

An abundant parasite of Lepidoptera, more or less gregarious, according to the size of the infested cater-

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pillar. The elongate brown cocoons are usually agglomerated, and covered with a common web, of thin texture and paler colour. Frequently bred both here and on the Continent: first by Nees v. Esenbeck, June 28th, from *Calymnia trapezina*, L., in Franconia; by Bouché from *Hylophila prasinana*, L.; in Holland, according to Van Vollenhoven, from *Noctua ditrapezium*, Bork., *Tortrix podana*, Scop., and *T. corylana*, Fab.; in England by Dorville from *Nephopteryx spissicella*, Fab.; by Billups from *Epichnopteryx radiella*, Curt.; by Elisha from *Depressaria alstrœmeriana*, Clerck; by Porritt from *Tortrix heparana*, Schiff., or *ribeana*, Hüb., and very numerously from *Hyponomeuta evonymellus*, L.; by Bignell from *Hydrœcia petasitis*, Doubled., and *Tortrix viridana*, L.; and by Scott from *Vanessa Atalanta*, L.

2. *Macrocentrus marginator*, Nees.

Bracon marginator, Nees, Mag. Ges. Berl., 1811, p. 14; *Rogas marginator*, Nees, Mon., i., 205; Wesm., Nouv. Mém. Ac. Brux., 1835, p. 176; Ratz., Ichn. d. Forst., ii., 65; *M. marginator*, Hal., Ent. Mag., iii., 138, ♂ ♀.
Rogas nidulator, Nees, Mon., i., 204, ♂ ♀.
R. obscurator, Ratz., Ichn. d. Forst., ii., 65, ♀.

Stouter than Sp. 1. Black, shining; palpi testaceous or dark, more or less; the maxillary elongate, pilose. Antennæ ♂ ♀ longer than the body, about 45-jointed. Thorax and scutellum faintly punctulate; metathorax rugose. Wings fusco-hyaline; stigma fuscous, paler at the base, ovate-lanceolate, narrower than in Sp. 1; nervures, radix, and squamulæ fusco-rufescent; 2d cubital areolet elongate, not attenuated exteriorly. Legs rufous; upper trochanters, 4 anterior coxæ, and apex of the hind pair, black; hind tibiæ and tarsi more or less dark, except at the base; in large specimens, black; all the tarsi dark. Abdomen shorter and broader than in other species; segments 1—2 rugulose, sometimes very faintly; 2d smooth at the apex, margined at the sides as far as the middle; 3d slightly rugulose at the base, or sometimes smooth; the rest smooth and shining. Terebra longer than the body. ♂ ♀. Length, 2½—4¼; wings, 5—8½ lin.

Var. *a*. Palpi black; 2d segment smooth. *Rogas nidulator*, Nees. ♂ ♀.

Var. *β*. Antennæ rufous in the middle. ♀.

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The variations are trifling, and depend chiefly upon size, and the degree of rugosity observable upon the first two abdominal segments.

Not so common as the preceding species. Bred by Billups from *Sesia culiciformis*, L.; a ♀ of var. *nidulator*, and of the largest size, from *S. spheciformis*, Fab., by Tugwell, at Greenwich; according to Van Vollenhoven, from *S. formiciformis*, Esp., and *tipuliformis*, Clerck. Also by Scott from *Depressaria angelicella*, Hüb. Haliday found it in Ireland and the Hebrides, and remarks that he frequently saw the ♀ vaulting over and settling upon sand-hills inhabited by burrowing Hymenoptera. A ♂ sent to Ratzeburg by Bouché was reputed to have issued from a gall of *Dryophanta folii*, L.; but here some error seems probable.

3. *Macrocentrus thoracicus*, Nees.

Bracon thoracicus, Nees, Mag. Ges. Berl., 1811, p. 14; *Rogas thoracicus*, Nees, Mon., i., 204; Wesm., Nouv. Mém. Ac. Brux., 1835, p. 172, ♂; *M. thoracicus*, Hal., Ent. Mag., iii., 138; Ratz., Ichn. d. Forst., iii., 67, ♂ ♀.

Macrocentrus bicolor, Curt., Ent. Mag., i., 188, ♀.

Elongate, slender, black; thorax rufous, sometimes obscure above. Mouth and clypeus rufous. Maxillary palpi elongate, yellow. Head very transverse, 3 times broader than long. Antennæ ♂ ♀ much longer than the body, very slender, 49—54-jointed, fuscous, the 2 first joints testaceous. Prothorax black above; metathorax subrugulose, not shining, fuscescent towards the base. Wings hyaline; stigma, costa, radix, and squamulæ yellow; nervures pale fuscous; pobrachial areolet much longer than the præbrachial, so that the podiscoidal becomes ⅓ shorter than the prædiscoidal. Legs elongate, slender, flavo-testaceous. Abdomen linear, slender, pubescent, much longer than the head and thorax; segments 1—2, and base of 3, striated; 1st deeply canaliculated; 2d finely margined as far as the middle; 3d smooth at the apex; posterior segments of the ♀ compressed. Terebra longer than the body. ♂ similar; antennæ 2½ times as long as the body. Length, 3—3½; wings, 6—7 lin.

Not very common; Nees v. Esenbeck captured a ♀ in Franconia, and Curtis another in England; Wesmael possessed 4 males from Belgium, and I have a ♂ taken in Darenth Wood, and a ♀ from Pré Wood, St. Albans.

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The species is recorded by Van Vollenhoven as a parasite of *Depressaria applana*, Fab., and *D. chœrophylli*, Zell.; and, by Ratzeburg, of *D. nervosa*, Haw. Bred by Bignell out of *Noctua triangulum*, Hufn., and *Xylina ornithopus*, Rott. *Mesochorus fuscicornis*, Brischke, is its hyperparasite.

4. *Macrocentrus infirmus*, Nees.

Rogas infirmus, Nees, Mon., i., 203, ♀; Wesm., Nouv. Mém. Ac. Brux., 1835, p. 178, and 1838, p. 151; *M. infirmus*, Hal., Ent. Mag., iii., 139, ♂ ♀.

Black; palpi pale testaceous, the maxillary short, not longer than the head; mandibles testaceous. Head subdepressed; face short, very broad, transverse. Antennæ fuscous, with the base of the flagellum testaceous; shorter than in spp. 1—3; in the ♀ rather stout, shorter than the body, 30—33-jointed; in the ♂ 37-jointed, longer than the body. Mesothorax less gibbous than in the others, its sutures punctulate; metathorax not shining, granulated. Wings dull hyaline; stigma fuscous, pale at the base; nervures fuscous; radix and squamulæ dull stramineous; 2d abscissa of the radius as long as the 1st intercubital nervure. Legs shorter and stouter than in any other species; pale testaceous, femora and tibiæ generally infuscated towards the apex; hind coxæ sometimes fuscous at the base; femora subclavate. Abdomen linear, segments 1—2 and base of 3 very faintly and partially aciculated, hardly less shining than the rest; 1st segment oblong, not narrowed at the base, obsoletely canaliculated; tubercles obtuse; 2d margined laterally at the base; belly pale at the base. ♂ similar; antennæ longer, entirely black; palpi obscure; abdominal segments 1—3 almost smooth; 1st segment attenuated at the base; tubercles more acute; legs dull rufous, coxæ and femora at the apex more broadly infuscated. Sometimes the antennæ and legs are more slender, approaching the structure of the next species, but the wings remain distinct. Length, 1½—2¼; wings, 2¾—4 lin.

Common; a gregarious parasite. Bignell bred 2 females from *Eupœcilia curvistrigana*, Wilk.; and 172, all females, from a single caterpillar of *Hydrœcia petasitis*, Doubled., on Sept. 9th; at the time when he communicated this fact to me all the parasites were not disclosed. I have frequently captured both sexes.

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5. *Macrocentrus collaris*, Spin.

Bracon collaris, Spin., Ins. Lig., ii., 140; *Rogas collaris*, Nees, Mon., i., 204, ♀; Wesm., Nouv. Mém. Ac. Brux., 1835, p. 179; Ratz., Ichn. d. Forst., iii., 67, ♂ ♀; *M. collaris*, Hal., Ent. Mag., iii., 140, ♀.

Bracon ebeninus, Nees, Mon., i., 67, ♂.

Macrocentrus picipes, Hal., *l. c.*, ♂.

More slender than *M. infirmus*, with longer legs and antennæ. ♀. Black; clypeus, palpi, mandibles, prothorax, mesonotum, and legs rufo-testaceous. ♂. Only the clypeus and mandibles rufo-testaceous; legs fuscous or blackish. Maxillary palpi short, not longer than the head. Antennæ ♀ as long as the body, 31-jointed; of the ♂ longer, 35-jointed. Metathorax punctulate. Wings hyaline; stigma fuscous with a pale spot, or flavo-testaceous with a fuscous spot; nervures, radix, and squamulæ fuscescent; 2d abscissa of the radius much shorter than the 1st intercubital nervure. Legs elongate, slender; 2d joint of trochanters fuscous at the base in the ♀; femora not subclavate; hind tarsi much longer than those of *M. infirmus*. Abdominal segments 1—2 hardly rugulose; the rest quite smooth; 1st segment attenuated at the base; tubercles obtuse in the ♀, more salient in the ♂; 2d segment laterally margined at the base, sometimes piceous in the ♀.

Common; Wesmael captured 8 females and 6 males near Brussels on the flowers of the dwarf elder, *Sambucus ebulus*; it was a frequent species in Wiltshire, where I obtained a good series; found in Ireland on a sandy coast by Haliday. A parasite, according to Ratzeburg, of *Anobium pertinax*, L.

ii. Zele, *Curt.*

Zele, Curt., B. E., 415 (1832); Hal., Ent. Mag. iii., 140.

Phylax, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 159.

Head twice as broad as long; vertex convex, but not ridged transversely. Radial nervure of the hind wings sinuated; radial areolet sometimes geminated by a transverse nervure. Spurs of hind tibiæ as long as half the metatarsus, or longer. Second abdominal segment not canaliculated on each side.

Head as broad as the thorax; occiput margined, slightly concave; ocelli protuberant, contiguous; eyes large; face subquadrate, flattened; clypeus semicircular, discrete, with a fovea on each

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side of the base; mandibles acutely bidentate; maxillary palpi elongate, 3d joint dilated on the inner side, 4th longest; 2d joint of the labial palpi strongly dilated, obliquely truncated. Antennæ setaceous, longer than the body, about 50-jointed. Mesothoracic lobes not gibbous; sutures distinct. Metathorax short, subtruncate posteriorly. Wings ample; stigma lanceolate; radial areolet oblong, lanceolate; radius subsinuated, reaching the apex of the wing; 1st cubital areolet receiving the recurrent nervure beyond the middle; 2d smaller, oblong, its lower interior angle produced, acute; podiscoidal areolet closed. Legs elongate, the hind pair scarcely stouter; spurs elongate. Abdomen longer than the thorax, subsessile, subclavate, falcate, compressed posteriorly in the ♀, and truncated at the extremity, with 8 segments visible; 1st linear, forming ⅓ of the entire length of the abdomen, widened close to the base, where the tubercles are situated; the following segments shorter; 2d not margined laterally; posterior segments transverse; anal forceps of the ♂ subexserted, compressed, obtuse; terebra short, compressed, recurved.

The insects are solitary parasites of Lepidoptera. They are among the largest of European Braconids, and much resemble the *Panisci* among the Ichneumons, as well as some of the larger *Meteori*. This is owing to their testaceous colour; one, however, of our species is almost black. The likeness to *Meteorus* is enhanced by the similar neuration; even the radial areolet of the hind wings is similarly coarctate, and in two species divided by an accessory nervure. The structure of the abdomen offers the readiest means of distinction; in *Meteorus* there is a real petiole, and the spiracles of the 1st segment are removed further from the base; in *Zele* the 1st segment, however slender, is not petiolated but subsessile, and the spiracles are quite close to the base.

Table of Species.

(2) 1. Radial areolet of the hind wings not geminated by a transverse nervure .. 1. *testaceator*, Curt.

(1) 2. Radial areolet of the hind wings geminated.

(4) 3. Colour rufo-testaceous .. .. .. 2. *chlorophthalma*, Nees.

(3) 4. Colour black .. .. 3. *discolor*, Wesm.

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1. *Zele testaceator*, Curt.

Zele testaceator, Curt., B. E., 415; Hal., Ent. Mag., iii., 141, ♂ ♀.

Rogas annulicornis, Nees, Mon., i., 201, ♂; *Phylax annulicornis*, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 160, and 1837, pl. f. N, 2 (spur of tibia).

Rufo-testaceous; tarsi whitish; 2d and following abdominal segments of the ♂ sometimes infuscated above. Palpi pale; mandibles dark at the tips; stemmaticum blackish; eyes green. Antennæ ♀ fuscescent towards the apex. Above the radix of the wings is a black dot. Metathorax obsoletely punctulate, indistinctly areated. Wings dull hyaline, with an indistinct transparent streak beneath the stigma, passing through the 2d cubital areolet; nervures fuscous; costa in the ♀ testaceous; stigma, radix, and squamulæ yellowish; radial areolet of the hind wings contiguous, coarctate owing to a sinus of the cubital nervure, but not geminated. Abdomen obsoletely punctulate at the base; 1st segment smooth anteriorly, longitudinally elevated in the middle. Terebra as long as the 1st abdominal segment. ♂. Antennæ stouter, more broadly fuscous, ⅓ longer than the body, the articulations annulated with fuscous; abdomen often fuscous above. Length, 4—5; wings, 9—10½ lin.

Moderately common with us; more abundant, and widely distributed, on the Continent; numerous Belgian examples are in Wesmael's collection. Bred by Fransen at Rotterdam out of *Leucania obsoleta*, Hüb.

2. *Zele chlorophthalma*, Nees.

Rogas chlorophthalmus, Nees, Mon., i., 202 (excluding the synonym); *Z. chlorophthalmus*, Hal., Ent. Mag., iii., 142; *Phylax chlorophthalmus*, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 162, ♂ ♀.

Rufo-testaceous; tarsi concolorous, as well as the abdomen of the ♂. Very like the preceding, but more slender; wings more ample, stigma and radial areolet broader; radial areolet of hind wings petiolated, coarctate, and geminated by a transverse nervure; legs more slender; abdomen shorter, clavate, less compressed. Terebra shorter, not surpassing the apex of the abdomen. Length, 3—3¾; wings, 7¼—9 lin.

This species and the next constitute Förster's genus *Homolobus*, having the radial areolet of the hind wings

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divided, but not otherwise distinct. *Z. chlorophthalma* was supposed by Nees v. Esenbeck to be the *Bracon chlorophthalmus*, Spin.; but this cannot be proved, and the description applies equally to *Meteorus chrysophthalmus*, Nees.

Rare; taken near Turin, Vienna, and Friburg; Wesmael had a pair found near Brussels and Liége; Haliday's specimen was from Scotland, and I beat one out of a nut-tree near Abergavenny.

3. *Zele discolor*, Wesm.

Phylax discolor, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 162, ♀.

Similar in structure to the two preceding; black, or nigropiceous; mouth and legs testaceous; hind tibiæ fuscous, except at the base. Mandibles dull testaceous; palpi whitish. Antennæ much longer than the body. Pectus and pleuræ usually rufous posteriorly; metathorax sometimes rufous at the sides. Wings ample, dull hyaline; stigma and nervures fuscous, radix and squamulæ testaceous; radial areolet of the hind wings petiolated, coarctate, and geminated by a transverse nervure. Four anterior legs pale flavo-testaceous; hind legs somewhat darker, their tibiæ and tarsi blackish, the former pale at the base. Terebra shorter than the truncated extremity of the abdomen. Male unknown. Length, 3—3½; wings, 7—8 lin.

Rare; Wesmael first captured 3 specimens in June, near Brussels; Capron discovered the species to be British, by taking it at Shiere; Bignell has since bred several at Plymouth from *Cabera pusaria*, L., one of which he communicated to me, and I have since taken a specimen on the wing, in Wiltshire. It has also been bred by Fransen at Rotterdam from *Eugonia alniaria*, L. The cocoon is elongate, oval, white, and thin, with a medial zone of denser texture forming a whiter band.

XXII. DIOSPILIDES.

Occiput margined; head transverse; vertex not excavated; middle ocellus not placed in a fovea. Fore wings with 3 cubital areolets; radial areolet elongate, metacarpus longer than the stigma; axillary areolet with an incomplete transverse nervure. Hind femora simple. Abdomen sessile or subsessile, ovate or oblong, not longer than the thorax, or very little longer. Terebra elongate.

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Maxillary palpi 5—6-, labial 3—4-jointed; mandibles bidentate; clypeus in front rounded, sinuated or acuminate. Mesothoracic sutures distinct. Metathorax sometimes areated. Second cubital areolet rhomboid, trapeziform, or triangular; recurrent nervure variously inserted; prædiscoidal areolet sometimes petiolated. Abdominal sutures indistinct, the 2d obsolete.

The genera *Aspidogonus*, Wesm., and *Microtypus*, Ratz., must be regarded for the present as belonging to this subfamily; they are exceptional in several respects; the former from the clavate antennæ of the ♂, the latter from the triangular 2d cubital areolet; but neither of them is yet known as British. Förster has also placed here his genus *Laccophrys*, otherwise *Cenocœlius*, already discussed among the *Helcontides*. *Anostenus*, Först., differs from *Diospilus*, Hal., too slightly to be here adopted. My new genus *Dolops*, with 2 species, cannot enter into any other subfamily. Haliday's *Dyscoletes*, with the recurrent nervure evected, must also be provisionally included in the group.

The species are black, rarely piceous, of small or moderate size, and parasites of Coleoptera; only a few of the genus *Diospilus* have been reared in England; but a fine pair of *Aspidogonus diversicornis*, Wesm., lately sent to me from France, were bred from *Melandrya caraboides*, L.

Table of Genera.

(2)	1. Prædiscoidal areolet touching the parastigma, not petiolated; head subcubic	i. Diospilus.
(1)	2. Prædiscoidal areolet remote from the parastigma, petiolated; head contracted behind the eyes.	
(4)	3. Metathorax completely areated; 1st abdominal segment striated; pobrachial areolet of hind wings divided by a transverse nervure; their radial areolet contiguous	ii. Dolops.
(3)	4. Metathorax not areated (or very obsoletely); 1st abdominal segment smooth; pobrachial areolet of hind wings not divided; their radial areolet petiolated	iii. Dyscoletes.

i. Diospilus, *Hal.*

Diospilus, Hal., Ent. Mag., i., 262, and iii., 133; Reinh., Berl. ent. Zeit., 1862, p. 329.

Taphæus, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 189; Ratz., Ichn. d. Forst., ii., 56, and iii., 60 (fig.).

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Maxillary palpi 6-, labial 3-jointed. Clypeus truncated or rounded in front, with 2 deep basal foveæ. Metathorax not areated. Second cubital areolet rhomboid or trapeziform; recurrent nervure much rejected; prædiscoidal areolet not petiolated; 1st abscissa of the radius very short; radial areolet lanceolate, ending before the apex of the wing. Legs short. Abdomen short, sessile, rounded at the sides. Terebra elongate.

Form short, stout, with large head and small abdomen; body black, shining; the deep impressions at the base of the clypeus, and the rhomboid or subquadrate form of the 2d cubital areolet, are marks which distinguish this genus among the *Polymorphi;* one species, *D. speculator*, Hal., is aberrant, having the 2d cubital areolet contracted on its upper side. To the genus *Diospilus* belong several Bracons of Nees v. Esenbeck (Sectio IV., Tribus i., Macrocephali, Mon., i., 60—67), viz., *melanoscelus*, *dispar*, *filator*, *capito*, and *ephippium*. Of the others there described, *nobilis* is a *Doryctes; analis* a *Cenocœlius; flavicornis* an *Aspidogonus: ebeninus* a *Macrocentrus; dissimilis* and *gagates* remain still unknown. *Eubadizon trigonus*, Nees, is a *Microtypus*. This disposes of the list of difficulties given by Haliday in his description of *Diospilus* (Ent. Mag., iii., 134); he was acquainted with 3 species, but considered one of them, *capito*, Nees, a variety of the common *oleraceus;* Wesmael published 5 species, and Reinhard, in his paper on *Diospilus*, in the Berl. ent. Zeit., 1862, has raised the number to 11. Five British species will be noticed here, of which one is new; they are not easy to identify.

Table of Species.

(4) 1. Palpi testaceous.

(3) 2. Second cubital areolet subquadrate .. .. 1. *oleraceus*, Hal.

(2) 3. Second cubital areolet much narrowed anteriorly .. .. 5. *speculator*, Hal.

(1) 4. Palpi blackish.

(8) 5. Radius ending nearer to the tip of the wing than to the stigma.

(7) 6. Metathorax smooth; terebra longer than the abdomen .. .. 2. *capito*, Nees.

(6) 7. Metathorax rugulose; terebra not longer than the abdomen .. .. 3. *ovatus*, n. s.

(5) 8. Radius ending nearer to the stigma than to the tip of the wing .. .. 4. *morosus*, Reinh.

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1. *Diospilus oleraceus*, Hal.

Diospilus oleraceus, Hal., Ent. Mag., iii., 134 (not the varieties); Reinh., Berl. ent. Zeit., 1862, p. 331, ♂ ♀, pl. i., f. 8 (wing).
Taphæus conformis, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 191, ♂ ♀.

Black, shining; palpi pale; mandibles rufous. Face broad; 2 deep impressions above the clypeus, which is convex between them. Antennæ testaceous beneath at the base; those of the ♀ 24—25-jointed, filiform, hardly longer than the head and thorax; of the ♂ 26—29-jointed, subsetaceous, as long as the body. Mesothoracic sutures impunctate. Metathorax rugulose, with 2 smooth basal areæ. Wings broad, hyaline; squamulæ testaceous; stigma black, large, triangular; nervures fuscous, paler towards the base; 2d cubital areolet longer than broad, its angles right angles; prædiscoidal areolet touching the parastigma; cubital nervure of the hind wings straight. Legs testaceous; hind coxæ and tips of hind tibiæ often more or less blackish. Abdomen ovate, depressed, shorter and narrower than the thorax; 1st segment rugulose, rather longer than broad, narrowed at the base, striated in the middle; the other segments smooth; sutures subobsolete; lateral margins reflexed, embracing the ventral surface. Terebra as long as the body without the head. ♂ ♀. Length, 1¼—1½; wings, 2⅔—3¼ lin.

Var. ♀. Antennæ 23-jointed; length, 1 line.

Common in gardens; taken by Haliday on *Brassica rapa* and *Sinapis nigra*. Bred by Giraud out of galls on the roots of *Lepidium draba* formed by *Ceuthorrhynchus rapæ*, Gyl.; by Reinhard from similar galls of *C. assimilis*, Payk., on *Sinapis arvensis*; by Billups from the earthy cocoons of *C. sulcicollis*, Gyl., found at the roots of *Brassica oleracea*.

2. *Diospilus capito*, Nees.

Bracon capito, Nees, Mon., i., 64, ♀; *D. capito*, Reinh., Berl. ent. Zeit., 1862, p. 332, ♂ ♀.
Diospilus oleraceus, var. β, Hal., Ent. Mag., iii., 135.
Taphæus fuscipes, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 192; Ratz., Ichn. d. Forst., iii., 60, fig.

Smaller than the preceding; palpi blackish. Antennæ 21—23-jointed; 2d joint often testaceous or piceous; 3d testaceous at the

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base. Metathorax shining, smooth, or hardly rugulose, indistinctly areated. Wings as in *oleraceus*. Base and upper edge of femora, and tibiæ at the apex, fuscous; sometimes the legs are almost entirely black. First abdominal segment smooth in the middle, rimulose at the sides. Terebra as long as abdomen and metathorax. Otherwise like *oleraceus*. ♂ ♀. Length, ¾—1; wings, 2—2¼ lin.

Obtained plentifully by Brischke on the wood of an old bathing-machine, and supposed to be a parasite of *Anobium* (Ratz., *l. c.*). I have taken it in Leicestershire and Yorkshire, and not uncommonly on *Umbelliferæ* near Teignmouth; Billups has also found it at Peckham.

3. *Diospilus ovatus*, n. s.

Niger palpis concoloribus. Facies punctulata nitida; clypeus convexus; mandibulæ basi rufæ. Utriusque sexus antennæ 23-articulatæ, articulo 3tio basi anguste testaceo. Metathorax rugulosus, obsolete areatus. Areola radialis stigmate paulo longior et latior, inter stigma alæque apicem in medio desinens; radius curvatus; areola cubitalis 2da lateribus parallelis. Pedes testacei femorum latere externo tibiarumque posticarum apice fuscis, tarsis fuscescentibus. Feminæ abdomen rotundatum, maris ovatum, breve; segmentum 1um postice latiusculum, feminæ transversum, maris latitudine apicali non longius; medio et apice lævigatum, lateribus rimulosis. Terebra abdomine non longior.

Black, with black palpi. Face punctulate, shining; clypeus convex; mandibles rufous at the base. Antennæ ♂ ♀ 23-jointed, 3d joint narrowly testaceous at the base. Metathorax rugulose, obsoletely areated. Radial areolet rather longer and broader than the stigma, ending half-way between the stigma and the apex of the wing; radius curved; sides of the 2d cubital areolet parallel. Legs testaceous, outer edge of the femora and apex of the hind tibiæ fuscous; tarsi fuscescent. Abdomen ♀ rounded, ♂ ovate, short; 1st segment much widened behind, transverse in the ♀, in the ♂ not longer than its apical width; smooth in the middle and at the apex, rimulose at the sides. Terebra not longer than the abdomen. Length, 1¼; wings, 2⅜ lin.

The ♀ differs from the two preceding and from *morosus* in the shortness of the terebra; the ♂ is distinct from *oleraceus* by the colour of the palpi and legs, the shorter, narrower radial areolet, and the number of joints of the antennæ; from *capito* by the radial areolet and the

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greater size; from *morosus* by the greater size and 23-jointed antennæ. *D. robustus* and *inflexus*, described by Reinhard, have the terebra not longer than the abdomen, but in both of them the cubitus of the hind wings is angulated near the base, which is not the case with the present species.

Described from a ♂ and ♀ taken by Billups at Peckham, in September.

4. *Diospilus morosus*, Reinh.

Reinh., Berl. ent. Zeit., 1862, p. 332, ♂ ♀.

Black, with black palpi. Face punctulate, almost dull; clypeus rounded. Antennæ ♂ ♀ 21-jointed; 3d joint narrowly testaceous at the base. Distinguished from *oleraceus* and *capito* by the radial areolet, which is shorter and narrower, not longer or broader than the stigma, and ending a little nearer to the stigma than to the apex of the wing; 2d cubital areolet shorter, its inner angle somewhat produced, and hence the sides are not quite parallel. Fore femora at the apex, and tibiæ, rather pitchy-testaceous; tarsi and apex of hind tibiæ fuscous. Otherwise like *capito*. ♂ ♀. Length, 1; wings, 2¼ lin.

Billups has found this species at Peckham, and I have taken it at Niton in the Isle of Wight.

5. *Diospilus speculator*, Hal.

Diospilus speculator, Hal., Ent. Mag., iii., 135, ♀; Reinh., Berl. ent. Zeit., 1862, p. 333, ♂ ♀.

Taphæus irregularis, Wesm., Nouv. Mém. Ac. Brux., 1835, p. 193, ♂ ♀.

Form more slender. Black; prothorax rarely, and abdominal segments 2—3 frequently, piceous or testaceous; mouth, clypeus, and base of antennæ broadly, testaceous. Face punctulate. Antennæ filiform, 27-jointed, those of the ♀ as long as the body, of the ♂ much longer. Metathorax finely rugulose, reticulated. Wings narrower than in other species, fumato-hyaline; stigma and nervures fuscous; radix and squamulæ rufous; 2d cubital areolet contracted above, forming a truncated triangle; radial areolet much longer than the stigma; radius straight. Legs testaceous; hind pair more obscure, generally with a fuscous spot or line on the upper edge of their femora near the apex; all the tarsi tipped with fuscous. Abdomen obovate, lanceolate, hardly longer than the thorax; 1st segment reticulato-rugulose, bicarinated at the

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base, the apical angles smooth, depressed. Terebra as long as the body without the head. ♂ ♀. Length, 1¾; wings, 3¼ lin.

This species serves as a connecting-link between *Diospilus* and *Aspidogonus;* it forms the genus *Anostenus*, Först., characterised by the shape of the 2d cubital areolet.

Common in many places, especially in a wood near my house at Nunton, Wilts; taken once by Haliday in Ireland; also noticed in Belgium and Germany.

ii. Dolops, n. g.

Palpi maxillares 6-, labiales 4-articulati. Clypeus brevis, transversus, antice elevatus, bisinuatus, foveis 2 ordinariis prope basin distinctis. Metathorax regulariter areatus. Areola cubitalis 2da magna, trapeziformis; nervus recurrens interstitialis; areola prædiscoidalis petiolata; radii abscissa 1ma elongata, 2dæ fere æqualis; areola radialis lata, cultriformis, alæ apicem attingens. Pedes crassi, longiusculi. Abdomen oblongum, ovatum, sessile, lateribus rotundatis, reflexis. Terebra elongata.

Maxillary palpi 6-, labial 4-jointed. Clypeus short, transverse, bisinuated on the front edge, and elevated; with 2 basal foveæ. Metathorax regularly areated. Second cubital areolet large, trapeziform; recurrent nervure interstitial; prædiscoidal areolet petiolated; 1st abscissa of the radius almost as long as the 2d; radial areolet broad, cultrate, reaching the apex of the wing. Legs stout, of moderate length. Abdomen oblong-ovate, sessile, rounded at the sides. Terebra elongate.

Head somewhat transverse, not wider than the thorax, produced behind the eyes; occiput concave, margined. Mandibles retracted, a space being left between them and the clypeus, which is raised on the front edge, as in the case of certain *Opiides*. Front slightly excavated. Prothorax produced. Mesothoracic sutures distinct. Mesopleuræ smooth, shining, with a crenate fovea. Outer side of the 2d cubital areolet decolorous; pobrachial areolet longer than the præbrachial; anal nervure not interstitial. Radial areolet of the hind wings contiguous; pobrachial areolet bisected by a transverse nervure; pobrachial nervure obsolete. Abdomen elongate-ovate, not longer than the thorax; 1st segment broad, a little longer than its apical width, bicarinated, striolated; the other segments smooth and shining; segments 2—3 forming together half the length of the abdomen; suturiform articulation obsolete; apical segments very short. Terebra as long as the body, or longer. Sexes similar.

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These insects differ from *Aspidogonus* in their neuration, and in the structure of the clypeus; I know nothing else with which they can be compared. *Bracon dissimilis*, Nees (Mon., i., 65) and *B. gagates*, Nees (Mon., i., 67) seem to be congeneric, but hardly identical with the species here described. Their habits are not known.

Antennæ ♀ 37-, ♂ 40-jointed; terebra as long as the body; hind legs not much longer than the middle pair .. .. 1. *hastifer*, n. s.

Antennæ ♀ 27—33-, ♂ 38-jointed; terebra longer than the body; hind legs elongate, much exceeding the middle pair .. .. 2. *aculeator*, n. s.

1. *Dolops hastifer*, n. s.

Niger, nitidus, ventre antice piceo, pedibus cum coxis rufis, tarsis obscurioribus; palpis rufis, maxillarium articulo 1mo fusco; antennarum scapo subtus et ore rufis; mandibulis apice nigris. Caput thoracis fere latitudine; vertex transversus; frons levissime excavata; occiput concavum, marginatum. ♀. Antennæ filiformes, corpore longiores, 37-articulatæ. Prothorax humilis, transverse striatus. Mesothorax antice fere in perpendiculum truncatus, lobi medii angulis porrectis, suturis crenulatis in spatium cancellatum ante scutellum conniventibus. Metathorax brevis, subrugulosus, postice subito declivis, carinis 4 longitudinalibus duabusque transversis in areas 7 partitus; area media cancellata. Alæ subfumato-hyalinæ, longius ciliatæ, squamulis rufis, stigmate, nervis, fuscis, areolæ cubitalis 2dæ latere externo decolori. Pedes cum coxis omnibus rufi, tarsis obscurioribus. Abdominis segmentum 1mum latitudine sua apicali vix longius, marginatum, bicarinatum, medio reticulato-rugulosum, utrinque fortius striatum, tuberculis parum conspicuis; segmenta cætera lævissima. Valvula ventralis anum non excedens. Terebra corpore non brevior. ♂. Paulo minor, antennis longioribus, 40-articulatis, segmento 1mo angustiore.

Black, shining, belly piceous at the base; mouth and under side of the scape rufous; mandibles black at the tips; 1st of joint of maxillary palpi fuscous, the rest rufous. Head almost as broad as the thorax; vertex transverse, front slightly excavated; occiput concave, margined. ♀. Antennæ filiform, longer than the body, 37-jointed. Prothorax situated low down, transversely and irregularly striated. Mesothorax elevated, almost vertical in front, angles of the middle lobe prominent; sutures crenulate, converging into a cancellated space before the scutellum; antescutellar fovea cancellated. Metathorax short, abruptly sloping

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behind, subrugulose; 2 longitudinal carinæ spring from the middle of the base, and diverge to the declivity, from whence they are nearly parallel to the apex, the enclosed space is cancellated; 2 lateral carinæ, connected with the preceding by transverse branches, form a system of areation as complete as in most Ichneumons: hinder angles of the metathorax obtusely prominent. Wings subfumato-hyaline, ciliated; squamulæ rufous; stigma and nervures fuscous; outer side of the 2d cubital areolet decolorous. Legs rufous, including all the coxæ; tarsi somewhat obscure. First abdominal segment hardly longer than its apical breadth, margined, bicarinated, rugulose in the middle, more deeply striated at the sides, the extreme base smooth, excavated; posterior angles depressed; in the middle of the hind margin is a smooth tubercle, with a deep triangular fovea on each side, including the suture, and therefore common to segments 1—2; 2nd and following segments very smooth; 2—3 connate, and together much longer than 1; 4 short; 5—6 annuliform. Ventral valve not surpassing the anus. Terebra as long as the body. ♂ somewhat smaller; antennæ longer, 40-jointed; 1st segment narrower. ♂ ♀. Length, 2—2⅓; wings, 4—4¼ lin.

My specimen was taken in Leicestershire; Bignell found one in S. Devon, and several more, including the ♂, have been collected by Capron near Guildford.

2. *Dolops aculeator*, n. s.

Præcedenti proxime affinis, minor, gracilior. ♀. Ater, nitidissimus, ventre maximam partem pallide piceo, pedibus cum coxis rufis, coxis posticis nonnunquam basi fuscis; etiam femoribus 4 posterioribus supra vel apice, tibiisque posticis apice cum tarsis fuscescentibus. Antennæ feminæ 27—33-articulatæ. Metathorax ut in præcedente, sed lævior, carinis mediis propius distantibus, area inclusa angustiore, profundius cancellata. Alæ præcedentis. Abdominis segmentum 1mum apicis latitudine nonnihil longius, utrinque marginatum, bicarinatum, ubique concinne striatum, tuberculis prominulis; cætera lævia, nitidissima. Terebra corpore paulo longior. ♂. Antennæ 38-articulatæ; tibiæ posticæ præter basin fuscescentes.

More slender, and smaller than the last species, with longer hind legs and terebra. ♀. Deep black, very shining, belly almost entirely pale piceous; legs rufous, together with the coxæ; hind coxæ sometimes fuscous at the base; 4 posterior femora more or less fuscescent above or at the apex; hind tibiæ at the apex, and tarsi, fuscescent. Antennæ ♀ 27—33-jointed. Wings and meta-

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thorax as in the preceding, but the latter is smoother, its medial carinæ more approximated, including a narrower space more deeply cancellated. First segment rather longer than its apical breadth, margined, bicarinated, regularly striated; tubercles somewhat prominent; the other segments smooth, very shining. Terebra somewhat longer than the body. ♂. Antennæ 88-jointed; hind tibiæ fuscescent, except at the base. ♂ ♀. Length, 1¼—1¾; wings, 2¼—3¾ lin.

Bracon gagates, Nees, must be very near the ♂ of this species; it seems to differ only in having black legs. One ♀ taken among nettles on a treeless down at the top of the cliffs near Teignmouth; and a pair at Cornworthy, S. Devon, the ♀ of which is of much smaller size.

iii. Dyscoletes, *Hal.*

Dyscolus, Hal., Ent. Mag., iv., 39; S. v. Voll., Schets., II. Braconiden, tab. vi. (wings).

Dyscoletes, Hal., in Westw. Int., ii., Gen. Syn., 62.

Elongate, slender. Maxillary palpi 6-, labial 4-jointed. Clypeus straight on the front edge, above which is a semicircular elevation, projecting over the anterior margin. Metathorax not areated. Second cubital areolet narrow, trapeziform, very obliquely placed, the inner lower angle strongly produced; recurrent nervure evected; prædiscoidal areolet petiolated; 1st abscissa of the radius almost as long as the 2d; radial areolet narrow, cultrate, not quite reaching the apex of the wing. Legs elongate, slender. Abdomen linear, lanceolate, subsessile. Terebra elongate.

Head transverse, wider than the thorax, abruptly rounded behind the eyes. Occiput concave, margined. Clypeus touching the mandibles, and closing the mouth. Antennæ placed on a protuberance of the front; behind each is a shallow depression. Prothorax produced. Mesothoracic sutures visible. Mesopleuræ smooth, shining, with a crenate fovea. Second cubital areolet narrow, oblique, its inner angle much produced; the 1st intercubital nervure if completed would be 3 times as long as the 2d, but both are incomplete; pobrachial areolet longer than the præbrachial. Radial areolet of the hind wings petiolated; pobrachial areolet not divided. Abdomen as long as the thorax; 1st segment twice as long as its apical breadth, bicanaliculated, smooth, with a medial longitudinal ridge; suturiform articulation obsolete; segments 2—3 nearly reaching the apex of the abdomen; the following segments very short.

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1. *Dyscoletes lancifer*, Hal., undescribed.

Piceus, palpis et thoracis disco saturatioribus; capite, antennis, abdominis dimidio apicali, terebræque valvis nigricantibus. Antennæ ♀ 28-articulatæ, corpore longiores, apicem versus subincrassatæ; flagelli articulus basalis sequentibus duobus simul sumptis longitudine æqualis. Prothorax rugulosus. Mesothorax punctis magnis distantibus impressus; punctorum intervalla subtilissime exarata. Metathorax subtilius at confertius punctulatus, elongatus, deplanatus; in uno tantum specimine, eoque minimo, arearum vestigia ægre discernenda. Alæ subfumato-hyalinæ, angustæ, elongatæ; stigma piceo-testaceum fusco circumditum; nervi pallidi, fusci. Pedes cum coxis piceo-testacei. Abdomen totum læve, nitidum. Terebra quam corpus quadrante longior. Mas latet.

Piceous; palpi and disk of thorax darker; head, antennæ, apical half of abdomen, and valves of terebra, blackish. Antennæ ♀ 28-jointed, longer than the body, somewhat incrassated towards the extremity; 1st joint of flagellum nearly as long as the two following together. Prothorax rugulose. Mesothorax beset with large distant punctures, between which are a few minute longitudinal scratches. Metathorax elongate, deplanate, punctulate, more thickly than the mesothorax, but with smaller punctures; the smallest specimen has some traces of areæ on the metathorax; not so the others. Wings subfumato-hyaline, narrow, elongate; stigma pitchy testaceous, with a fuscous circumscription; nervures pale fuscous. Legs, including the coxæ, pitchy testaceous. Abdomen wholly smooth and shining. Terebra ¼ longer than the body. Male unknown. Length, 1¾—2; wings, 3—3½ lin.

This insect has remained unknown since the time of Haliday, who published no description of it, but made a sketch of the wings, reproduced in Van Vollenhoven's 'Schetsen.' From this source Dr. Capron and I succeeded in identifying four females in his collection taken at Shiere, near Guildford. I have since seen two more, taken near Brussels, among the unexamined specimens of Wesmael's collection.

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Explanation of Plates X. & XI.

PLATE X.

Fig. 1. *Eubadizon flavipes*, Hal., ♀.
2. *Calyptus tibialis*, Hal., ♀.
3. *C. fasciatus*, Nees, ♀.
4. *Pygostolus sticticus*, Fab., ♀.
5. *Blacus tuberculatus*, Wesm., ♀.
6. *B. humilis*, Nees, ♀.
7. *Liophron muricatus*, Hal., ♀.
8. *L. edentatus*, Hal., ♂.

PLATE XI.

1. *Centistes fuscipes*, Nees, ♀.
2. *Ichneutes reunitor*, Nees, var. ♀.
3. *Cenocœlius analis*, Nees, ♀.
4. *Zele discolor*, Wesm., ♀.
5. *Macrocentrus abdominalis*, Fab., ♀.
6. *Diospilus oleraceus*, Hal., ♀.
7. *D. irregularis*, Wesm., ♀.
8. *Dolops hastifer*, n. s., ♀.
9. *Dyscoletes lancifer*, Hal., ♀.

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VII. *Descriptions of new or little-known species of* Glenea *in the collection of the British Museum.* By Charles J. Gahan, M.A., F.E.S., Assistant, Zool. Dept., British Museum.

[Read February 6th, 1889.]

Glenea speciosa, n. s.

Capite nigro, cæruleo-vittato; prothoracis dorso sparse punctato, nigro, cæruleo-trivittato; prothoracis lateribus, corpore subtus, et femoribus, flavo-ferrugineis, leviter aureo-ochraceo-pubescentibus; scutello et vitta suturali apicem nec attingenti, fulvo-brunneis; elytris valde punctatis, nigris, maculis viginti cæruleis ornatis, humeris prominulis antice paullo productis, apicibus emarginatis quadri-spinosis. Long. 22 mm., lat. 6½ mm.

Hab. Java.

Head black; with two narrow pale blue vittæ on the front, and two on each side, of which one, beneath the eye, curves backwards below to meet the second, which runs somewhat obliquely downwards on the side of the head; with four pale blue vittæ on the vertex—two in the middle closely approximated and posteriorly slightly diverging, two at the sides continuous with the lateral vittæ on the disk of the prothorax. Prothorax on the sides and underneath of a yellowish red colour, similar to that of the rest of the under side of the body. A narrow border at the base of the prothorax, the scutellum, and a sutural vitta, which extends about three-fourths of the length of the elytra, with a rusty brown, somewhat silky pubescence. The remainder of the elytra black, with about twenty pale blue spots, arranged in transverse rows, the first of four, the remaining eight rows of two spots each, alternately nearer to and farther from the suture. The shoulders very prominent and projecting forwards a little. The apices each with two well-marked spines, of which the outer is longer than the sutural. The tibiæ (a small portion at their bases excepted) and the tarsi black, with a bluish grey pubescence. The middle tibiæ longitudinally sinuate, but without a groove.

This very distinct and beautiful species is the *Colobothea speciosa* of Dejean's Catalogue. In the single

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female specimen in the collection the antennæ are damaged; they are black, with a bluish pubescence on the two basal joints.

Glenea Bowringi, n. s.

♂. Cyaneo-chalybeata; capite albo-pubescente; prothoracis dorso vittis tribus, latis, albis; scutello, vitta suturali, fascia obliqua ante apicem et maculis quatuor singulo elytro albo-pubescentibus, humeris elytrorum prominentibus, acutis; apicibus truncatis breviter quadri-spinosis; pedibus fulvo-ferrugineis; tibiis anticis mediisque et antennis nigris. Long. 24 mm., lat. 8 mm.

Hab. Java.

Head sparsely punctured in front, with a whitish pubescence, except at the sides, behind the lower lobes of the eyes. Prothorax with a whitish pubescence below, and three rather broad longitudinal white vittæ above, of which the two lateral widen out a little at the base so as to be approximated to the median vitta; punctured somewhat in patches between the vittæ. Scutellum white. Elytra of a fine metallic-blue, strongly and rather closely punctured, with the punctures in regular rows towards the sides, and more irregular along the middle of the disk; with a small oblique linear white spot on each side of the scutellum, and a sutural white vitta, which terminates behind at the point where it is joined by an oblique white fascia running outwards and backwards across each elytron; with, on each elytron, four distinct white spots, of which the most anterior and largest is somewhat elongated, and placed at the base midway between the suture and shoulder; the second, oval, a little behind the first and nearer to the suture; the third, at about the middle of the length of the elytron, almost touching the sutural vitta; the fourth, the smallest and most external, close to the uppermost lateral carina; the apices truncated and spinose, with the outer spines scarcely longer than the sutural. The body underneath steel-blue, with the sides spotted with white. The first two joints of the posterior tarsi reddish brown, the remaining two black; the tarsi and tibiæ of the anterior and middle legs black.

Glenea albomaculata, n. s.

♀. Chalybeato-violacea; pube squamosa, atro-fusca induta capite albo-bi-vittato; prothorace albo-tri-vittato, vitta mediana in medio interrupta; singulo elytro maculis quinque magnis et duabus minimis, albo-tomentosis, ornato; humeris prominulis;

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apicibus oblique truncatis breviter quadri-spinosis; pedibus ferrugineis, tibiis anticis mediisque et antennis nigris; corpore subtus albo-maculato. Long. 27 mm., lat. 9 mm.

Hab. Borneo.

Head sparsely punctured in front, with two whitish vittæ, which are widely separated at the base, closely approximated above between the upper lobes of the eyes, and slightly divergent on the occiput. Each cheek with a white spot, whose upper border is in a line with the upper border of a white patch on the side of the prothorax immediately above the coxal cavity. The lateral vittæ of the thorax rather broad and visible from above, the median dorsal vitta interrupted in the middle, with its anterior part narrow and linear, its posterior or basal part spot-like. Scutellum with a rounded white spot behind. Elytra strongly but very sparsely punctured, each with five large white spots, of which the first, oval, is placed on the middle of the disk a little behind the base; the second, smaller and rounded, in a line with the first, and at some distance behind it; the third nearer the suture and behind the middle of the elytron; the fourth touching the uppermost of the two lateral carinæ; the fifth, oblong and oblique, a little in front of the apex; in addition two minute white points, one external to and behind the second spot, the other close to the suture between the fourth and fifth spots. The sides of the breast spotted with white. Each of the first four abdominal segments with two white spots, the fifth with one spot, on each side. Legs reddish brown, with the tibiæ and tarsi of the anterior and middle legs black.

In the collection there is a single damaged female specimen of an undescribed species from Sumatra, which resembles very much the present species in its markings, but differs by the following characters :—

Head, disk of thorax, and elytra more closely punctured; the vittæ on the vertex of the head not joined to those on the front; a white spot on each side of the head above, in addition to the spot on the cheek below; the lateral vittæ on the prothorax narrower; the posterior white point absent from the elytra; the apices of the elytra transversely truncate, with the sutural spines obsolete. The pubescence much fainter, and of a brownish grey colour.

Glenea bimaculiceps, n. s.

Violacea; capite punctato, maculis duabus supra rotundis, niveis, distantibus; prothoracis disco vitta media nivea, in medio interrupta; elytris violaceis, valde punctatis, maculis octo rotundatis et fascia, transversa, præ-apicali, niveis, ornatis, apicibus

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truncatis, angulis minutissime dentatis; corpore subtus niveo-maculato, femoribus totis, tibiis posticis versus apicem, et tarsis posticis, rufo-fulvis; antennis nigris. Long. 27 mm., lat. 7 mm.

Hab. Moulmein (Burmah).

Head violet-black, rather thickly punctured, with two snow-white rounded spots above, one behind the constricted part of each eye. Prothorax dark violet, with a large snow-white patch on each side just above the coxa, and a single median white vitta on the disk, the vitta interrupted a little in the middle, with its posterior part broadening out towards the base in the form of a spatula. Scutellum white. Elytra of a deep violet colour, with eight rather large rounded snow-white spots arranged in four rows of two each, which are alternately nearer to and farther from the suture, the third row at about the middle, the fourth a little behind the middle, of the elytra. With, a little before the apex, a transverse white fascia extending from the outer margins and slightly interrupted at the suture. The apices transversely truncate, with a very minute and scarcely perceptible tooth at each angle. The sides of the meso- and meta-sterna spotted with white, and each of the first four abdominal segments with a single large sub-semicircular white spot on each side. The femora reddish yellow and glossy; the tibiæ and tarsi of the anterior and middle legs greyish black, the posterior tibiæ (their bases excepted) and tarsi fulvous-brown. Antennæ black, with a faint greyish pubescence.

The spots on the elytra are arranged as in *G. lepida*, Newm., and *G. aphrodite*, Thoms., but the two round white spots on the upper side of the head distinguish the present from any other species of the genus known to me.

Glenea flavocincta, n. s.

♀. Capite nigro, fronte flavo-bivittato; prothorace flavo-pubescente, dorso antice nigro; elytris nigris, valde punctatis usque ad medium, fascia lata, flava sub-mediana, lateribus obtuse carinatis, carinis pone medium evanescentibus, apicibus late truncatis quadri-spinosis pedibus et corpore subtus flavo-testaceis leviter ochraceo-pubescentibus; tibiis mediis nec emarginatis; antennis nigris. Long. 15—17 mm., lat. 5½—6 mm.

Hab. Burmah.

Head black, minutely and sparsely punctured, with two parallel and rather widely separated yellowish vittæ on the front, and a fainter yellowish vitta on each cheek. Prothorax yellowish pubescent, with a narrow black pubescent patch at the anterior border

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of the disk. Elytra deep black, with a faint velvety black pubescence, strongly punctured from the base as far as the anterior border of a pale yellow transverse band, which is situated partly in front of but mostly behind the middle, and which gradually narrows from the suture to the external margins. The outer spines at the apices a little longer than the sutural. The legs and under side of the body yellowish testaceous, with a faint ochraceous pubescence. Middle tibiæ somewhat longitudinally sinuate towards the base, but without any trace of a groove.

Two female specimens in the collection.

Glenea modica, n. s.

Capite prothoraceque supra fusco-nigris, lateraliter albo-flavis; elytris fusco-nigris cum parte basali et fascia transversa ante apicem, luteo-pubescentibus; apicibus truncatis, spinis suturalibus minutis, spinis externis validis. Long. ♂ 10, ♀ 13½ mm.

Hab. Burmah.

Front of the head sparsely punctured, with a pubescence faint and greyish in the middle, closer and yellowish white at the sides, and continuous below with the yellowish white pubescence on the cheeks. Prothorax brownish black above, with a yellowish white pubescence at the sides, which gradually extends higher up from before backwards, and, towards the base, becomes visible from above. Elytra with their declivous sides entirely dark brown, with the basal part of the disk, for nearly half its length, covered with a close buff pubescence, and with a similarly coloured transverse band at some distance from the apex. The latter truncate and spined, with the outer spines very strong, the sutural spines minute. The sides of the first four abdominal segments and two spots on the fifth yellowish white. Legs yellowish testaceous. Antennæ black.

This species has a close general resemblance to *G. udetera*, Thoms., and other allied species, from which it may be distinguished by the close buff pubescence covering the anterior part of the disk of the elytra, and almost wholly concealing the punctures on that part. The posterior border of this area is strongly convex behind.

Glenea distinguenda (Dej. Cat.), n. s.

Capite et prothorace supra atris; hoc linea media cinerea; elytris dimidio basali cervino, macula transversa utrinque ad

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medium, alteraque quadrata utrinque ad apicem ochraceis; pedibus flavo testaceis, antennis nigris. Long. ♂ 11, ♀ 13½ mm.

Hab. Java.

The sides of the head and thorax and the whole of the under side of the body with a dull greyish pubescence. The upper side of the prothorax black, with a line along the middle and a very narrow border at the base and at the apex dull ashy or tawny. The basal half of the elytra fawn-coloured, sparsely punctured; a slightly oblique spot on each elytron at the middle, a larger quadrate spot on each at the apex, and a minute dot midway between the middle and apex, ochraceous; the rest of the elytra dark brown. Legs yellowish testaceous, antennæ black.

This species resembles *G. anticepunctata*, Thoms., and other allied forms.

Glenea Dejeani, n. s.

Nigro-fusca; capite albo-bivittato; prothorace punctato, dorso albo-trilineato et lateribus bivittatis; elytris punctatis, disco lineis obliquis quatuor albis,—duabus antice et duabus postice,—et maculis tribus, parvis, utrinque ad medium; linea alba utrinque inter carinas laterales; corpore subtus, medio excepto, albo-pubescente. Long. 12 mm.

Hab. Java.

Head rather sparsely punctured, with a whitish pubescence on the sides, with two white vittæ on the front, which are continuous above with two white lines on the vertex. Prothorax rather thickly punctured, with three white lines on the disk—the middle line complete and continuous with a median white line on the scutellum, the lateral lines incomplete; with a white vitta on each side in addition to the white patch above the coxal cavity. Elytra rather strongly punctured throughout, with three small white spots on each—one median, the remaining two external to this, with one in front of, the other behind it, and with three white lines on each—one at the side between the lateral carinæ, and extending nearly the whole length of the elytron, another arising at the middle of the base, running a little obliquely towards the suture, and terminating before the middle, the third beginning a little behind the middle close to the suture, passing in a somewhat curved manner outwards, and ending just at the base of the external spine. Legs and antennæ dark brown, like the rest of the body; the tarsi with a greyish pubescence above; with, in the anterior and middle tarsi of the male, the first joint broader and distinctly

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longer than the following joints, and with the first joint of the posterior tarsus as long as the three succeeding joints taken together.

This species, of which there are two specimens—a male and a female—in the collection, is the *Sphenura interrupta* of Dejean's Catalogue, and is quite distinct from the *Glenea interrupta* of Thomson, with which it is placed as a synonym in the Munich Catalogue.

Glenea lecta, n. s.

Fusco-nigra; capite punctato, nigro; prothorace supra albo-pubescente, macula magna, nigra, punctata, in medio disci; scutello albo; elytris fuscis antice albo *x*-notatis, postice albo bimaculatis; corpore subtus lateraliter albo-maculato; pedibus antennisque nigris. Long. 10 mm.

Hab. Silhet (N. India).

Head with a very faint greyish pubescence. Prothorax having a whitish pubescence above, with a transversely oval, black, strongly punctured spot on the middle of the disk, and a somewhat similar but much smaller spot on each side just above the outer angle of the coxal cavity. Elytra bicarinate on each side, and strongly but rather sparsely punctured; with two oblique spots near the base, connected by a short sutural vitta with two larger transverse spots at the middle, and forming on the elytra an ashy white figure somewhat resembling the letter *x*; with, in addition, a white oval spot at about the beginning of the apical fourth of each elytron. The apices transversely truncate, with the outer angles spined, the sutural angles acute, but not spined. With a large white spot on each side of the hind breast, and a transverse white spot on the side of each of the three intermediate abdominal segments.

Glenea signaticollis, n. s.

Rufo-brunnea; capite punctato, in medio frontis leviter—circum oculos dense—albo-pubescente, vertice vittis duabus albis; prothorace supra albo-pubescente, maculis duabus longitudinalibus leviter arcuatis, ad medium conjunctis et antice marginem attingentibus, rufo-brunneis; scutello albescente; elytris rufo-brunneis, punctatis, maculis decem albo-pubescentibus, lateraliter utrinque bicarinatis, apicibus truncatis angulis externis spinosis, angulis suturalibus minute dentatis; pedibus antennisque testaceis. Long. 12 mm.

Hab. India (Bombay ?).

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Prothorax with two slightly arcuate longitudinal spots or fasciæ, which reach the anterior margin, but do not reach the base, and which meet together on the middle of the disk; these spots reddish brown and punctured. Elytra light reddish brown, bicarinate, and serially punctured on each side, more irregularly punctured on the disk, with ten pubescent rounded white spots, of which six smaller, and arranged in a hexagonal manner, are on the basal half, two larger behind the middle almost touch the suture, and two of intermediate size between the large spots and the apex are placed close to the lateral carinæ. Apex with a faint ashy border. Body underneath reddish brown, with white pubescent spots at the sides.

Glenea sex-notata, n. s.

Capite et prothorace fulvo-cinereo-pubescentibus; hoc vittis sex nigris; elytris fulvo-testaceis subtiliter fulvo-pubescentibus singulisque maculis tribus transversis, quadratis, nigris,—duabus ante medium, tertia pone medium; corpore subtus cinereo-pubescente, nigro-maculato; pedibus fulvo-testaceis; antennis testaceis et versus apicem fuscis. Long. 12 mm.

Hab. S. India.

Head with a median line and a spot on the front black. Prothorax with six equidistant longitudinal black vittæ, of which four are visible from above; sparsely punctured along the black vittæ. Scutellum black, with a tawny line in the middle. Elytra pale testaceous, with a faint tawny pubescence, and with three black transverse quadrate spots in the same longitudinal line on the disk of each, with two of these spots placed in front of, the third at some distance behind, the middle; the base of the elytra sparsely punctured, the shoulders prominent and acute, the apices quadrispinose, with the outer spines longer than the sutural. Body underneath with an ashy grey pubescence, which is somewhat darker along the middle; the sides of the breast spotted with black, and each of the abdominal segments, the fourth excepted, with an oblique black spot on each side.

This species somewhat resembles *G. scapifera*, Pasc., but is readily distinguished from it by the colour of the antennæ, as well as by the number and position of the spots on the elytra.

Glenea punctata, n. s.

Nigra; capite sparse punctato; prothorace subrugoso-punctato; elytris rufo-testaceis, subnitidis, grosse et creberrime punctatis, lateraliter utrinque bicarinatis. Long. 10—14 mm.

Hab. S. India.

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Head and prothorax dull black and faintly pubescent. Scutellum black. Elytra brick-red, somewhat glossy, very strongly and thickly punctured, with two carinæ on each side in addition to the marginal carina, with four very minute tufts of short whitish hairs on each elytron; the apices truncate, with the outer angles spinose, the sutural angles dentate. Body underneath black, somewhat glossy, faintly pubescent, with a greyish white spot at the apex of each post-episterum, and a similar white spot near the postero-lateral angle of each of the abdominal segments. Legs and antennæ black.

A large series of this species has recently been brought from the Nilghiri Hills by Mr. Hampson. In many specimens the minute white tufts have entirely disappeared from the elytra.

Glenea socia, n. s.

Sulphureo-pubescens; capite nigro-maculato; prothoracis disco maculis quatuor nigris, in medio conjunctis; elytris macula suturali pone scutellum, singuloque macula parva ad medium, plaga irregulari pone humerum, et fasciis duabus transversis versus apicem, nigris; pedibus testaceis; antennis nigris. Long. 10—12 mm.

Hab. Ceylon.

With a sulphur-yellow pubescence. The front of the head with a black spot in the middle below joined to a broader somewhat squarish spot above, which again is united by a short line with a broadly triangular black space on the vertex. Prothorax with four petaloid black spots above—two anteriorly and two posteriorly—all united together on the middle of the disk; with a small black spot high up on each side, and a larger black spot just above the coxal cavity. Elytra with a single carina on each side, extending about half their length from the shoulder; with a single sutural black spot just behind the scutellum, and each with a small spot at the middle, two transverse fasciæ (which do not reach the suture) towards the apex, and an irregular figure behind the shoulder, black. The apices truncate, with the outer angles spined. Body underneath with a sulphur-yellow pubescence spotted with black. Legs testaceous. Antennæ black.

This species seems closely allied to the species which bears the manuscript name *Glenea sulphurella*, White, and which is, I have little doubt, the *Glenea multiguttata* of Guérin, though the length (20 mm.) given for

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the latter is much greater than that of any of the specimens in the collection, the largest of which is not more than 14 mm.

Glenea 14-maculata.

Saperda 14-maculata, Hope, Gray's Zool. Miscellany, 1831, p. 28.

"Sulphurea, thorace 6-maculato elytrisque octomaculatis pedibusque testaceis." Long. 10 mm., lat. 3 mm.

Hab. N. India.

Head and prothorax with a rather close sulphur-yellow pubescence; the latter with four black spots, in two rows, on the disk, and one, smaller, on each side. Elytra reddish testaceous, with a sulphur-yellow pubescence; with a single distinct carina on each side, which is not continued quite up to the external apical spine, and with four black spots on each elytron forming a longitudinal row nearly midway between the suture and the lateral carina. Body underneath yellowish pubescent. Legs yellowish testaceous. Middle tibiæ without a groove. Antennæ black.

M. Thomson, in the Appendix to his 'Systema,' p. 566, has placed *G. 14-maculata*, Hope, as a synonym of *Glenea maculifera*, Thoms. The latter species is unknown to me, but it can scarcely, I think, be identical with Hope's species, seeing that M. Thomson, in his too brief diagnosis, makes use of the expression "elytra 16-maculata." In any case, Hope's is a much older name.

Glenea crucifera, n. s.

♂. Sulphureo-pubescens; capite linea mediana et macula parva utrinque ad basin antennæ nigris; prothorace cum vitta media longitudinali et linea transversa paullo ante medium, nigris; elytris supra nigro fuscis, singuloque maculis sex magnis sulphureo-pubescentibus, lateribus brunneis, unicarinatis; apicibus per-oblique truncatis, angulis externis productis; corpore subtus sulphureo-pubescente; pedibus antennisque ferrugineo testaceis. Long. 13 mm., lat. 3½ mm.

Hab. Bhotan (N. India).

Head, prothorax, and body underneath with a thick sulphur-yellow pubescence. The head with a median line and a small spot on each of the antennal tubers black. The prothorax with a median longitudinal black vitta, crossed a little before the middle by a transverse line reaching from side to side. Scutellum yellow,

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with a line in the middle black. Elytra light brown at the sides; with a faint yellowish pubescence below the shoulders; dark brown above, with six large sulphur-yellow spots in a single row on the disk of each—the basal spot smallest, the third and fourth largest and almost reaching the suture, the sixth spot touching both the suture and the apical margin. Legs and antennæ reddish testaceous. Middle tibiæ longitudinally sinuate towards the base, but not grooved.

A single male example in the collection.

Glenea ornata, n. s.

Sulphureo-pubescens; prothorace dorso maculis duabus oblongis nigro-fuscis; elytris lateribus rufo-brunneis, subnitidis, disco nigro-fusco, sulphureo-ornato; pedibus flavo-testaceis; antennis fusco-testaceis. Long. 14 mm.

Hab. Darjeeling (N. India).

Head with a median line and a spot on the front black. Prothorax with two large oblong black spots on the disk, and two small black spots on each side. Elytra, reddish brown and bare of pubescence at the sides, dark brown above, ornamented with spots and patches of yellowish pubescence arranged thus:—a somewhat T-shaped common basal patch, a round spot on each behind this, a large common ante-median somewhat lozenge-shaped spot, with its outer angles obtuse and slightly produced, a large common post-median *x*-shaped patch, and a transverse spot on each at the apex. Apices of the elytra transversely truncate, with the angles faintly dentate. Body underneath with a yellowish pubescence. Legs yellowish testaceous. Middle tibiæ devoid of a groove. Antennæ somewhat fuscous.

This species is allied to *G. S.-mariæ*, Thoms.

Glenea T-notata, n. s.

Sulphureo-pubescens; prothorace dorso maculis tribus nigro-fuscis T-formantibus; elytris versus basin fasciis duabus interruptis valde arcuatis, fascia transversa subsinuata ad medium, singuloque versus apicem maculis duabus transversis, nigro-fuscis; pedibus flavo-testaceis; antennis testaceis, versus apicem fuscis. Long. 11—14 mm.

Hab. Silhet (N. India).

With a sulphur-yellow pubescence. Head with a median black line. Prothorax with a rounded black spot on each side, with, on the disk, three linear black spots together resembling the letter T.

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Elytra with a yellow pubescence; with an oblique spot on each near the base, so placed in relation to an obliquely curved linear spot behind it, that the two together form a strongly arcuate interrupted fascia, with its convexity towards the suture; with a narrow, transverse, somewhat sinuate fascia at the middle reaching from the carina of one side to that of the other; with two narrow, transverse spots or fasciæ on each towards the apex, and with a linear fuscous spot passing obliquely downwards and backwards on the deflexed side of each elytron behind the shoulder. The lateral carinæ—one on each side—disappearing a little beyond the middle. Middle tibiæ without a groove. Body underneath yellowish pubescent, with an arcuate spot on each side of the breast and the anterior borders of the first three abdominal segments black.

This species, which is possibly the *Glenea sulphurea* of Thomson, is also closely allied to *G. S.-mariæ*. It differs from the latter by the spotted sides of the thorax, the pubescent sides of the elytra, and the strongly arcuate fasciæ towards the base.

Glenea? Amelia, n. s.

Parce pilosa; capite, prothorace, et corpore subtus cinereo-albo dense pubescentibus; capite supra pone oculos et macula parva in medio frontis, nigris; prothorace maculis quatuor nigris; elytris cervino-pubescentibus cum maculis fasciisque nigro-fuscis; pedibus flavis, unguiculo antico singuli tarsi bifido, unguiculo postico simplice; antennis nigris.

Hab. Siam.

Head with a close ashy white pubescence, with the upper side behind the eyes, the occiput, and a small spot on the middle of the front, black and visibly punctured. Prothorax with a similar pubescence, and with four rounded or somewhat oval black spots —two larger above, one smaller on each side. Scutellum whitish. Elytra with a fawn pubescence, with the shoulders, the deflexed sides, a spot on each near the base, a large rounded or subquadrate spot on each before the middle, an elongated, posteriorly outwardly bent spot on each behind the middle, and an apical transverse fascia, dark brown; the sides serially punctate, and indistinctly carinate; the apices broadly and somewhat obliquely truncate. Sides of the breast ashy white, spotted with black. Abdomen with its sides and the posterior border of each of the first four segments ashy white, with a triangular depression at the apex (♂?). Legs pale testaceous, sparsely pilose. Antennæ black, sparsely pilose below, about half as long again as the body.

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This pretty little species, which resembles *Daphisia pulchella*, Pasc., I refer with doubt to *Glenea*. It ought, perhaps, to be regarded as the type of a distinct genus. The claws present a character which, as far as I know, is not met with elsewhere among the *Lamiidæ*. The anterior claw of all the tarsi is "bifid," with the inner division a little longer than the outer; the posterior claw is, in each tarsus, simple. This character I find in each of three specimens belonging to the same sex, which is probably the male. Mr. Bates has, in *Glenea ocelota*, described a structure of the claws which he could not find alluded to in any generic description, but which is, if I follow his description correctly, of the kind existing in most of the N. American and a few of the European species of *Saperda*. This character—the presence in the male of a tooth on the outer side of the base of the anterior (or inner) claw of the anterior and middle legs—was first pointed out by Leconte. Lacordaire, while admitting it as far as the N. American species are concerned, has denied the existence of this character in any of the European species. It is present, however, in *S. carcharias*, *S. punctata*, *S. octopunctata*, and other species.

Notes.

M. Thomson having given the same name, *Glenea Mouhotii*, to two distinct species, I propose to substitute for the last described of these the name *Glenea mutata*. Its synonymy will therefore be—

Glenea mutata, n. s.

= *Glenea Mouhotii*, Thoms., Rev. et Mag. de Zoologie, 1879, p. 24, nec Syst. Ceramb., p. 566.

Glenea jucunda, Thoms., is synonymous with *G. giraffa*, Dalm.

The genus *Glenea* will, I think, include all the species placed under *Volumnia* in the Munich Catalogue, with the exception of *V. apicalis*, Chev., *V. Westermanni*, Thoms., and *V. guinensis*, Chevr.—the last two being little more than varieties of *V. apicalis*.

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VIII. *On the Pyralidina collected in* 1874 *and* 1875 *by* Dr. J. W. H. Trail *in the Basin of the Amazons.* By William Warren, M.A., F.E.S.

[Read February 6th, 1889.]

The insects treated of in the accompanying paper were collected in 1874 and 1875 by Dr. J. W. H. Trail in the Basin of the Amazons. The Rhopalocera and larger Heterocera were worked through and described by Mr. A. G. Butler in papers published in the 'Transactions' of the Entomological Society of London for the years 1877, 1878, and 1879. The remainder, namely, Deltoids and *Pyralidina*, were about the same period cursorily inspected, and in some cases identified, by the same gentleman; but from pressure of work and other causes were not exhaustively worked out and made the subject of a fourth paper. This unfortunate delay is all the more to be regretted, inasmuch as the collection contains not only several species at present unrepresented in the British Museum Collection, but likewise a considerable number of curious and aberrant forms.

The specimens themselves are 293 in number, belonging to 125 different species, about 50 of which I have been unable to identify as previously described or figured, while in several cases the formation of new genera has seemed necessary.

For the circumstances under which the collection was made, and the precise localities explored, it will be enough to refer to Mr. Butler's first paper, published in the 'Transactions' of the Entomological Society of London for 1877, p. 105.

There are, however, a few species to which special reference seems called for. And first, there are two very remarkable species of Pseudo-deltoids, *viz.*, an example of *Tortricodes alucitalis* of Guenée, described by him from a single damaged specimen, and a new species more closely allied to Walker's *Gaberasa ambigualis*, in

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both of which a fissure occurs in the hind margin of the fore wing, which thereby becomes bilobed, and at first sight appears fractured; but on closer inspection the marginal fringe is seen to be continued along both sides of the fissure. As might be expected, the neuration is modified and distorted; the nervules, which, were it not for the fissure, would run straight to the hind margin, are deflexed round its extremity, and curved downwards into the inner margin of the upper lobe. So unusual a departure from ordinary wing-structure would seem to warrant the separation of the species thus modified as a separate family.

The next group to which I would direct attention is that to which *Azamora penicillana*, Wlk., of the present collection, and Lederer's *Amblyura corusca* belong. The members of this group are all characterised by the possession of a membranous scale-clad pouch on the upper surface of the fore wing of the male near its base, extending usually half across the wing, but in one species embracing its whole width.

The number of species is probably very considerable; the British Museum Collection possesses as many as thirteen, and several more are figured in Felder's work; but the main point on which I wish to insist is that these species present us with every variety in the form of labial palpi that occurs in the Pseudo-deltoids: and I therefore come to the conclusion that the proper place for the family is in that group, and not, where Lederer would locate them, among the *Pyralidina*.

In conclusion, I will just call attention to the peculiar genus *Diastreptoneura*, in which the neuration is curved and distorted; and to the four new genera, *Dysglyptogona*, *Erebostrota*, *Triommatodes*, and *Atopomorpha*, the species of which, both from their superficial appearance and their neuration, arouse a suspicion that, just as the Noctuids pass into the Pseudo-deltoids, so these may in reality be nothing but abnormal *Geometridæ*. One thing is certain, that like the Rhopalocera, the Heterocera of South America are among the most variable and erratic in the world.

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ERASTRIADÆ.

1. *Erastria amazonia*, n. s.

Fore wing glossy, ochreous grey, with a dark blotch at the base of the costa, and another towards the apex beyond the second line, which is whitish. Hind wing dark fuscous. Expanse of wings, 20 mm.

The specimen is so much worn that it is impossible to give an exact description. It comes near *Erastria* (?) *basistigma*, Wlk., xv., 1762, from the West Indies, and to an unnamed species from Madagascar.

One ♂. R. Jutahi, February 5th, 1875.

REMIGIADÆ.

2. *Isogona inferior*, n. s.

Fore wings sandy brown, dusted with paler atoms, with two white transverse lines; the first straight before the middle, the second starting from the middle of the costa, at first runs obliquely outwards, forming a small sharp point, and then, slightly sinuous, inwards to the inner margin below the reniform stigma, the base of which it touches; both stigmata large and distinct, slightly darker than the ground colour, and finely bordered with paler; an oblique white streak from the apex nearly unites with the angle of the second line; three whitish costal dots before the apex; submarginal line represented by an indistinct series of dark blotches; a row of brownish lunules along the hind margin, festooned with lighter; the veins towards the hind margin paler. Hind wings with the reniform stigma, second line, and submarginal row of spots repeated. Head, thorax, and abdomen all sandy brown; the base of the abdomen bearing a short blackish tuft; under side dull sandy, unmarked, except by the submarginal row of spots. Expanse of wings, 24 mm.

One ♀, taken at the mouth of R. Sapo, Dec. 13th, 1874.

The species is considerably smaller than *Isogona continua*, Gn., of which Walker's *Massava scissa* is a synonym, and the coloration is different, but I think there can be no doubt that it is congeneric.

THERMESIADÆ.

3. *Dagassa marginata*, n. s.

Fore wings slaty fuscous, with four brown,—when fresh reddish brown,—transverse lines; the 1st, curved, near the base; the 2nd, angulated, before the middle; the 3rd, outwardly curved and

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sinuous, just beyond the middle, and followed closely by a fasciaform dark shade; the 4th submarginal, very indistinct, consisting of a series of wedge-shaped paler-edged dashes; orbicular stigma a dark dot between lines 1 and 2; reniform stigma a faint dark lunule between 2 and 3; costa narrowly cream-coloured from the base to the 3rd line, on which pale ground the origin of the first three lines appears blackish; four cream-coloured dots before the apex; fringes dark, with the extreme tips cream-coloured, except at the elbow above the anal angle, where they are wholly dark. Hind wings more brown, without the slaty tinge, with two straight transverse lines, the basal one brownish red, single; the central double, with a paler line between; fringes bright pale cream-coloured, with a central darker line towards the anal angle, preceded there by a curved cream-coloured mark. Palpi pale fuscous, the tips of 2nd and 3rd joints paler; head, thorax, and abdomen slaty fuscous; tip of the abdomen cream-coloured. Under side smooth, fuscous; fore wings with the 2nd and 3rd lines and both stigmata, hind wings with both lines, and a basal spot, dark; a submarginal row of dark blotches more or less distinct on all the wings. Expanse of wings, 30 mm.

Three females, one from R. Jurua, Nov. 12th, 1874, the others from R. Jutahi, 25th and 27th of January, 1875.

HYPENIDÆ.

4. *Hypena obditalis.*

Hypena obditalis, Wlk., Cat. Lep. Het. B. M., xvi., p. 48.

One ♂, without any note as to capture or locality.

In Walker's description "marginal lunules *white* with *black* points" should read "*black* with *white* points."

5. *Hypena munda*, n. s.

Fore wings dark mouse-coloured, with two transverse lines, the 1st slightly oblique, the 2nd straight, nearer each other on the inner margin than on the costa, the former edged internally with bluish grey and externally with brown, the latter externally with bluish grey and internally with brown; submarginal line sinuous, consisting of dark spots with white dots externally; marginal lunules black, with white dots internally; a minute black dot, often obsolete, represents the orbicular stigma; hind wing dull fuscous. Head, thorax, and abdomen the same. Under side pale fuscous, with two whitish spots showing through from the submarginal line near the costa. Expanse of wings, 30 mm.

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Three examples, all females, taken at light in different localities, *viz.*, Rio Mamellos, a tributary of Rio Madeira; Juruena, on Rio Purus; and Rio Jurua: the respective dates being June 1st, Sept. 24th, and Nov. 7th, 1874.

Akin to *H. hemonalis*, Wlk., Cat. Lep. Het. B. M., xvi., p. 228, from Brazil, but smaller; the wings narrower and paler, and wanting the white apical lunule, which is so conspicuous a feature in that species; the palpi also differ. In *H. hemonalis* they are blackish, the 3rd joint fringed with black to the apex; in *H. munda* they are greyish fuscous, the 3rd joint slender, *white*, with a laterally flattened brush of dark brown scales in the middle projecting above and below.

6. *Hypena fuscipennis*, n. s.

Fore wing dark fuscous, dusted with lilac-grey scales, especially in the spaces beyond each of the three transverse lines. First line oblique, 2nd sinuous, forming two rounded projections externally, and approaching the 1st on the inner margin; the intermediate space darkest, edged with fulvous lines; beyond the 2nd line is a greyish curved fascia, then a dark brown one; submarginal line pale, wavy, most distinct towards the anal angle; fringes dark fuscous, with a strong black basal line of dashes, which scarcely form lunules. Hind wing dark fuscous, as are the head, thorax, abdomen, and legs. Under side dark fuscous, without markings. Expanse of wings, 30 mm.

One ♂. R. Madeira, May 24th, 1874, at light.

7. *Hypena exoletalis.*

Hypena exoletalis, Gn., Delt. & Pyr., 29, 21.

One ♂ at light. Serpa, Feb. 13th, 1875.

The specimens in the Brit. Mus. Collection are from Rio Janeiro and St. Domingo.

Hyphypena, n. g.

Fore wing short and broad; costa arched from base to apex, which is slightly produced; hind margin very slightly incurved below the apex, and somewhat projecting above the anal angle; inner margin straight. Hind wing rounded. Neuration: cell extending beyond the middle, rather broad, and situated nearly midway between costa and inner margin; first subcostal branch starting before the middle of the cell; second at about one-fifth

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before the end; fifth just before end; third out of the fifth near its origin, the fourth out of the fifth just before the apex, these last two embracing the apex; radials from the ends of the disco-cellular; first median branch at one-fifth before the end, curved; second and third from the lower angle of the cell; interno-median fold strongly expressed. Hind wing with the costal free; the sub-costal with two long branches; first median branch at two-thirds; second and third on a short stalk from the lower end of the cell, along with the radial. Antennæ with angulated joints, ciliated beneath. Palpi long, upcurved, hairy; the second joint curved, cut off sharply at its apex; the third only half the length of the second, with a fine small point; forehead rough; tongue present.

This genus, as illustrated by the single species below mentioned, is characterised (1), by the abnormally large palpi compared with the size of the insect, these organs being half as long as the fore wings; and (2), by the absence of all the usual markings of the fore wing, which superficially somewhat resembles that of a *Tortrix*.

8. *Hyphypena bipunctalis*, n. s.

Fore wing ochreous-yellow, mottled with yellowish brown, and suffused with the same colour along the hind margin, and at the base and centre of the costa; a small black spot in mid-wing before the middle, and a double brown-black spot beyond the middle, both surrounded by paler; fringe pale, more or less varied with dark brown, especially towards the anal angle and the apex. Hind wing pale ochreous, with only the hind margin diffusely darker; fringes pale, with a reddish dividing line. Head, face, palpi, and thorax reddish ochreous; abdomen whitish ochreous. Under side: fore wing reddish ochreous, with the costa and fringes varied with brown-black; hind wing pale ochreous, the costal half speckled with brown, and a series of brown dashes at the base of the fringes. Expanse of wings, 16 mm.

Five males, all from R. Jurua, Oct. 31st, Nov. 1st and 6th, 1874.

The species bears a superficial resemblance to *Hypena obagitalis*, Wlk., from Ega, and to *Bucinna divisalis*, Wlk, xxxv., 1983 (=*Betousa divisalis*, Wlk., xxxiv., 1209) also from Ega; but may be distinguished at once by its very large palpi and the absence of any transverse lines: besides which the neuration is quite different.

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Before describing the next species it will be convenient to draw attention to an oversight of Walker's. In the Cat. Lep. Het. B. M., xv., p. 1640, he instituted the genus *Chadaca* for the single species *atrosignata*, represented by a ♀ from Venezuela. In vol. xxxiii., p. 1003, he erects a new genus *Rhosologia* for a species *porrecta*, represented by a ♂ from Mexico. This last is evidently the ♂ of *C. atrosignata*, and is slightly larger than the ♀. As Walker's description of the genus was taken from a ♀ only I append a fuller one.

Chadaca, *Walker.*

Fore wing broad; costa straight; apex slightly produced and acute; hind margin bulging out above the anal angle, and faintly incurved below the apex; hind wing rounded. Abdomen of ♀ short and blunt, not reaching beyond the hind wings; of ♂ longer, with more or less pronounced anal tuft. Palpi with the second joint ascending, convex above; third half as long as the second, rostriform, porrect, pale above and externally dark; forehead with a projecting tuft, pale, which, when the palpi are erect and contiguous, forms one surface with the terminal joint; tongue ill-developed. Antennæ with a longer lateral bristle on each segment, and slightly pubescent beneath in the ♀, densely pubescent in the ♂. Fore legs, like the outside of the palpi, always dark. ♀ rather smaller than ♂.

On p. 1641, *loc. cit.*, Walker remarks that "this genus has not much of the characters of the *Thermesiidæ*, and more of those of the *Poaphilidæ*, and may help to connect the two families." Its proper place, however, would rather seem to be before *Rivula*, from which I doubt whether it can be satisfactorily separated. Like it, *Rivula* has the frontal tuft concolorous with the terminal joint of the palpi; the outside of the latter and the fore legs dark; the ♀ smaller than the ♂, and the neuration identical. It differs apparently only in size and coloration.

Other species which should, I think, be referred, if not to the genus *Rivula* itself, at all events to its neighbourhood, are *Ecregma damætesalis*, Wlk., xvi., 252 (=*Glympis eraconalis*, Wlk., xix., 852), from Villa Nova; *Hyamia palpitatalis*, Wlk., from Ega; *Alinzia inconspicua*, Butler, from Natal; *Egnasia argillacea*, Butler, from Japan; and *Egnasia fallax*, Butler, from Japan.

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9. *Chadaca modesta*, n. s.

Fore wing pale mouse-colour, with all the markings very indistinct; a minute black dot at the base; a wavy dark line before, and another just beyond, the middle; submarginal line consisting of a series of lunate black spots between the veins; reniform stigma dark, conspicuous; a faint trace of dark lunules before fringe, which is concolorous. Hind wing, like fore wing, without markings. Head, palpi, face, thorax, abdomen, and legs all pale mouse-colour; outside of the palpi and fore legs brown. Under side without markings. Expanse of wings, 30—32 mm.

One ♂, Prainha, Nov. 14th, 1873; one ♀, Solimoes, Nov. 24th, 1874.

An inconspicuous-looking insect, the ♀ smaller than the ♂.

10. *Chadaca concatenalis*, n. s.

Fore wing whitish grey, dusted with minute dark dots, with a small black spot at the base, a subcontiguous loop of four or five black blotches, suspended from one-third to two-thirds of the costa; a row of black spots at base of the fringes, which are concolorous with fore wing. Hind wing paler white, without any dark frecklings, darker towards the hind margin, and with a dark line at the base of the fringes. Under side dull cinereous, with darker costa, dark base to the fringes, and a large dark central spot on each wing; outside of the palpi and fore legs blackish; head, face, thorax, and abdomen whitish grey. Expanse of wings, 24 mm.

One ♂ from R. Jamunda, April 11th, 1874.

11. *Epizeuxis marginata*, n. s.

Fore wing ochreous, tinged towards the hind margin with reddish; costa narrowly dark at the base, and with several dark spots, of which three in the middle are larger; a small black dot at the base in the middle, and a grey patch on the inner margin; a curved transverse line before the middle, and a sinuous denticulated one beyond, which approaches close to the first on the inner margin; each line rises from a dark costal spot; reniform stigma large, dark, lying in an obscure central shale, which also starts from a black costal spot. A zigzag pale submarginal line, preceded and followed by dark grey shading; fringes ochreous, with a series of fine curves along their base, the ends of which are produced so as to form a dark V-shaped mark internally between each curve,

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by which the appearance of a festoon is produced. Hind wing ochreous, suffused almost entirely with fuscous, except a diffuse patch near the anal angle. Some irregular black lines and spots along the centre; fringes as in fore wing. Head, palpi, and thorax ochreous; abdomen ochreous, with the middle segments greyer; terminal joint of the palpi with a broad black ring. Under side dull ochreous; fore wing more suffused with grey; all with a dark central spot; hind wing showing traces of two or three irregular bands. Expanse of wings, 24 mm.

One ♂. R. Jurua, Oct. 26th, 1874.

Paramimetica, n. g.

Fore wing with straight costa, acute apex, and curved hind margin. Hind wing rounded. Markings a succession of sinuous, alternate, pale and dark lines and shades, the same on both wings; the second line always preceded by a dark shade. Palpi laterally compressed, porrected, slightly ascending, the second joint roughly fringed above, the last joint short, upcurved, widened with scales in the middle, the whole having a feathery appearance; antennæ finely ciliated in both sexes. Neuration: Fore wing, 1st median branch from very little beyond the middle of the median; 2nd before the end; 3rd and 4th from the lower angle of the cell; 1st subcostal branch from the middle of the subcostal; 2nd just beyond it, running close and parallel to the 1st; 4th, and 5th short-stalked from upper angle of cell; 3rd out of the 4th just before the apex; radial from near the upper angle of cell. Hind wing: costal vein free; the two subcostal branches from the upper angle of cell; 1st median branch starting quite near the base before the middle of the median; 2nd and 3rd short-stalked from the lower angle of cell; radial from the lower part of the disco-cellular; the cells of both wings short.

I propose this genus for the reception of two or three species of small size and delicate structure, geometriform in appearance, having the markings of the fore wings reproduced on the hind wings, which do not agree well with any other *Hypenidæ*. Besides the two species here described, *Hypena sotiusalis*, Wlk., xix., p. 840, the type from St. Domingo, and *Megatomis* (?) *judicatalis*, Wlk., also from St. Domingo, must be included in the genus.

12. *Paramimetica subrufa*, n. s.

Fore wings pale ochreous, suffused with yellow, and with deeper ochreous or reddish brown markings; first line undulating, white,

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edged with darker; 2nd white, undulating and denticulated, starting from the middle of the costa and running out very obliquely towards the apex, then curving inwards and running parallel to first line; the space between these two lines is darker than the rest of the wing, and the second line is always preceded by a broadish brown fascia. Reniform stigma large, consisting of two dark spots surrounded by lighter; submarginal line white, undulating, parallel to the others; a marginal row of black spots. Hind wings with all the markings reproduced, and with a distinct black central spot. Head, thorax, abdomen, and palpi yellowish ochreous; under side sandy; all the wings with a black central spot, and a row of black marginal dots; a broad paler band beyond the middle. Expanse of wings, 18 mm.

Four females, one male; one female from Juruena, R. Purus, Sept. 24th, 1874; one female from Gaviao, R. Jurua, Nov. 10th, 1874; a female from the same river, Nov. 7th, and a pair *in cop.* on Nov. 1st, 1874.

Closely allied to *Megatomis* (?) *judicatalis*, Wlk., which has a dark brown apical spot, and also to *Hypena sotiusalis*, Wlk., both from St. Domingo. Indeed, the only difference is that *P. subrufa* has the three lines more or less edged with pale ochreous, the ground colour paler and clearer, and the fascia before the second line much more conspicuous.

The species, however, varies much in itself; two of the five specimens are ochreous, with the markings brown, and approaching much nearer to *H. sotiusalis*, though still paler; the other three have a pale *yellow* ground, and the markings *pink*.

13. *Paramimetica imitatrix*, n. s.

Fore wing ochreous, suffused with darker; first line thin, curved, brown, before the middle; second curved outwards, slightly dentated near the costa, then curving obliquely basewards, preceded by a broad brown fascia, which is followed by a paler one, in the middle of which lies a blackish-brown blotch; submarginal line indistinct; a marginal row of black dots, preceded by a dark grey fascia; fringes ochreous mixed with fuscous; orbicular and reniform stigmata represented by two black dots. Hind wings with the markings of the fore wings repeated. Head, thorax, and abdomen all ochreous, the dark fascia of the hind wings being represented across the abdomen. Under side ochreous, with

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indistinct lines; the two stigmata and the central spot on the hind wing large and dark. Expanse of wings, 16 mm.

One ♀ from Papunha, R. Jurua, Nov. 5th, 1874.

The species differs from *P. subrufa* in having the margin of all the wings scalloped, while in *P. subrufa* they are plain. The specimen is damaged about the head, and the final joint of the palpi (or rather palpus, as there is only one left), is denuded of scales and thin; so that possibly a better series of examples will justify its separation from the genus.

Paramacna, n. g.

Fore wing very broad, almost triangular; costa curved at the base, then straight to the apex, which is pointed; hind margin slightly bent inwards below the apex, then broadly convex, and again bent in a little before the anal angle, which is well-marked; hind wing rounded, with the hind margin slightly elbowed in the middle; wings with fine scaling, and with unusual markings. Labial palpi with second joint obliquely ascending, as high as the top of the head, clothed above and below with fine hairs, laterally compressed; third joint horizontally porrected, not more than one-third the length of the second, small, pointed, with closely appressed scales; forehead with a horny ridge between the antennæ; these in ♀ simple, laminated, subserrated towards the apex; the basal joint long and swollen; tongue present, but not large; maxillary palpi invisible; on the under side the cell in the fore wing is clothed with fine hairs; abdomen robust, with ovipositor exserted. Neuration: Fore wing, first median branch at one-fifth before the end of the median, which is curved upwards towards the end of the cell; second median branch a little before the end; third and lower radial from the end, which is very acute; disco-cellular strongly incurved basewards; upper radial from its upper end; third, fourth, and fifth subcostal branches on one stem, the fifth leaving soon after its rise and curving into the hind margin, third out of fourth shortly to the costa, fourth running into costa just before the apex. Hind wing with the costal and subcostal approximating in the centre, and united there by a short oblique transverse vein: costal with two branches; subcostal single; median branches and disco-cellular as in fore wing.

This genus agrees in many points with Walker's genus *Macna*, the only species of which, however, comes from Singapore. In neuration it accords entirely with the genus *Tamyra*, H.-S., to which, among others, *Lametia*

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ignitalis, Wlk., from Ega, *Hypena abrasalis*, Wlk., from Mexico, and *Hypena illapsalis*, Wlk., from Pará, belong; but the palpi are much shorter and simpler, and the colouring and markings wholly different.

14. *Paramacna arnea.*

Phalæna-Geometra arnea, Cram., Pap. Exot., i., p. 59, pl. 36, fig. G.

Fore wing pale green, with the costa broadly dull purplish brown, and a blotch of the same colour occupying the costal half of the central area to below the median vein; two obscure, brown, transverse lines, also extending the same distance below the median vein, the first before the middle at about one-fourth of the costa, the second starting from the middle of the costa, and running outwardly in a series of curves, concave outwardly between each nervure, showing more plainly in its lower part, where it traverses a pale ochreous blotch which lies obliquely below the end of the cell, and is bounded by a diffuse, curved, brown shade; reniform stigma distinct, brown; a brownish shade along the inner margin in the centre; fringe greenish. Hind wing and fringes silky ochreous, with a narrow brownish shading before the fringes. Head, thorax, and palpi pale greenish; terminal joint of palpi brownish; abdomen ochreous. Under side glossy ochreous, the darker tints of the fore wing showing through; a fringe of long silky hairs along the median vein of the fore wing. Expanse of wings, 36 mm.

One ♀. Faró, April 10th, 1874.

In a note to the figure of *Botys* (?) *linalis*, Felder, its close affinity to *Phalæna arnea*, Cram., is mentioned, and the remark added that perhaps it was really a specimen of that insect, of which the original green colouring had faded, as a result of damp. Felder's example was, like the present, from the Amazons. It is possible that in some cases the violet-brown tinge overpowers the green. At any rate, if the two *are* separate species, they are very closely related; but we must wait for a larger number of specimens before a really satisfactory conclusion can be arrived at.

AZAMORIDÆ.

Under this family I include all the genera, the species which are characterised by a peculiar, membranous, scale-covered pouch, which occurs near the base of the

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fore wings of the ♂. *Azamora* was Walker's earliest name for any of these insects.

15. *Azamora penicillana.*

Torda penicillana, Wlk., Cat. Lep. Het. B. M., xxviii., p. 437.

One ♀. Boâ Vista, R. Jutahi, Feb. 1st, 1875.

Closely related to *Amblyura corusca*, Ld., which, according to that author, belongs to the *Pyralidina*, but placed by Walker, along with several other abnormal genera, among the *Tortricina*. This latter position is clearly wrong; and when we consider that the various species characterised by the costal pouch possess all the different forms of labial palpi occurring among the Deltoids, we shall not, I think, be very far wrong in locating them here, in close connection with the genus *Tamyra*, H.-S.

HERMINIADÆ.

16. *Bocana pharusalis.*

Bocana pharusalis, Wlk., Cat. Lep. Het. B. M., xvi., p. 185, ♂ ♀.

B. orionalis, Wlk., ib., p. 186, ♀.

One ♀ at light. Marapatá, Rio Negro, Dec. 30th, 1874.

The fawn-coloured fore wing has two indistinctly-marked sinuous darker lines, one before, the other beyond the middle; both stigmata are represented by a small round silvery-grey spot, which in the specimens of *B. pharusalis* in the British Museum Collection are not visible. Walker gives 16 lines as the expanse of *B. pharusalis* and 17 of *B. orionalis;* the present specimen, however, measures only 14 lines, *i. e.*, about 30 mm.

17. *Bleptina albidiscalis*, n. s.

Fore wings deep fuscous, with two pale dark-edged sinuous transverse lines, each slightly bent just beneath the costa; the first close to the base, the second beyond the middle; reniform stigma linear, white; submarginal line scarcely visible. Hind wing deep fuscous, with one pale straight line; fringes concolorous. Head, thorax, and abdomen deep fuscous. Palpi with second joint long, curved; the third half as long as the second, securiform, with a minute acute apex, bright orange on the sides, especially externally,

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fringed above and below with fuscous. Under side dull fuscous; fore wing with white central spot, and the second and submarginal lines showing whitish, especially near the costa; hind wings with a single pale line. Expanse of wings, 39 mm.

One ♀ at light. Tabatinga, Nov. 29th, 1874.

Akin to *Bleptina pentheusalis*, Wlk., xvi., 128, from Venezuela.

18. *Bleptina hirtipalpis.*

Bleptina hirtipalpis, Wlk., Cat. Lep. Het. B. M., xvi., p. 242.

One ♂. R. Jamunda, April 12th, 1874; at light.

Walker's type is from Venezuela.

19. *Bleptina prunescens*, n. s.

Fore wings with a dull purple flush; with a curved brownish line near the base, and another beyond the middle; the latter preceded by a broadish brown-black shade, with which it coalesces on the inner margin; another still broader brown-black fascia comes before the submarginal line, which is indicated only by white points on the nervules; the reniform stigma consists of two white dots, one under the other, lying in the dark central shade; marginal lunules black, fringe purplish. Hind wings with the same series of markings as the fore wings, but with the basal half wholly dark. Head, thorax, and abdomen purplish fuscous. Under side ochreous-grey; each wing with a black central dot and two dark bands. Expanse of wings, 32 mm.

One ♀ at light. Jutahy, Jan. 31st, 1875.

Akin to *Bleptina* (*Bocana*) *hypenalis*, Wlk., from Ceylon, and *Bleptina* (*Bocana*) *incongruens*, Butler, from Japan; but the apex of the fore wings is more rounded than in those species; the second line is not denticulated, but simply curved, and the reniform stigma consists of two dots instead of a solid white spot.

20. *Bleptina olivescens*, n. s.

Fore wings dull olive, with deep purple lines; the first curved and sinuous before the middle, with a deep indentation basewards between the subcostal and median veins; the second sinuous and dentate beyond the middle; an indistinct central shade between them, nearer the second, and passing just outside the reniform stigma, which is represented by a small bluish-white dot; sub-

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marginal shade sinuous, distinct only near the costa; a marginal row of minute dark dots. Hind wings rather browner, with the markings of the fore wings repeated; fringes of both wings unicolorous. Head, thorax, and abdomen cinereous; palpi paler, fuscous, finely mottled with ochreous. Under side dull brownish grey, with the two outer lines alone showing darker, and a dark central spot in the hind wing. Expanse of wings, 30 mm.

Two specimens only, both females; one from Trompetas, Feb. 28th, 1875; the other from Guará, R. Solimoes, Nov. 22nd, 1874.

21. *Bertula biciliata*, n. s.

Fore wings dull fuscous, with traces of two sinuous dark lines, one before, the other beyond the middle, and a darker central shade between them; also of a blackish orbicular and reniform stigma, and of a submarginal line, beyond which the exterior margin of the wing seems to have been paler. Hind wings like the fore wings. The example is too much worn to admit of any exact description, as far as its markings are concerned; but the last joint of the palpi unfolds like that of *B. Talausalis*, from Venezuela, into a large fan-like tuft of hairs. The species, however, may best be distinguished by the peculiar antennæ: these, instead of being, as in *B. Talausalis*, armed with long thin pectinations, are thickly bipectinated, each pectination resembling a short claw, and bearing at its apex a fine hair of the same length as the claw itself; the stem of the antennæ is finely serrated above between the base of the pectinations. Expanse of wings, 42 mm.

One ♂. Gaviao, Nov. 10th, 1874; at light.

The constitution of the terminal joint of the palpi in the ♂ of this genus is very singular. It consists of a piece of thin membranous tissue, bearing fine scales on its outer surface, but with its inner surface clothed with long silky ochreous hairs, which can be expanded so as to form a large fan-like tuft.

Erebothrix, n. g.

Fore wing short and broad; costa gradually curved, slightly hollowed beyond the middle; hind margin nearly straight; inner margin curved at the base. Hind wing rounded, with the anal angle somewhat produced, and a broad flap along the inner margin clothed with bristly hairs. Palpi moderately hairy, curved upwards, and reaching only a little above the head; third joint

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only half as long as the second; antennæ with basal joint swollen, the first third stout and swollen, apparently without ciliation, then bent inwards, with a hollow on the outer side, in which are some strong cilia; the remaining two-thirds ciliated; legs strong; fore legs more densely scaled than the rest, but without a tuft. Neuration: Fore wing, first subcostal branch from about the middle, second one-fifth before the end, curved towards the stem of the third and fourth, which separate shortly before the apex; their stem along with the fifth subcostal from the upper angle of the cell; radials from the disco-cellular; first median branch at two-thirds; second and third from the lower end of the cell. Hind wing with the costal and subcostal united for a space, the subcostal with two branches; first median branch at one-third; second and third stalked from the lower angle of cell; radial from the disco-cellular, a little above the angle.

22. *Erebothrix semiusta*, n. s.

Fore wing pale ochreous dusted with brown, with no visible markings, except a coal-black, pear-shaped mark on the inner margin near the base, reaching half-way across the wing. Hind wing like the fore wing in colour, but with the whole inner half coal-black, and the anal flap beset with black bristly hairs; under side the same; fore legs, antennæ, and palpi tinged with brownish. Expanse of wings, 25 mm.

One ♂, from Lago Cerrada, R. Jurua, Oct. 30th, 1874. This specimen is much damaged, and the markings have evidently been worn away.

Physulodes, n. g.

Fore wing costa very slightly convex, the apex scarcely pointed; hind margin oblique and rounded at the anal angle. Hind wing rounded; palpi long, curved, ascending; the second joint well clothed with scales, the third thinly scaled, slender, as long as the second, and curved back over the head; antennæ finely pubescent beneath, with two longer cilia on each segment, and with a small tuft of hair-like scales at two-thirds, below which the stem is slightly hollowed out; fore tibiæ with an expansible tuft of hairs. Neuration: Fore wing, first subcostal from about the middle of the cell; second, third, and fourth on a common stem from about one-fifth before the end, the second soon separating, the third and fourth parting half-way to apex; the fifth and upper radial from the end of the cell: first median branch from the middle; second and

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third stalked, from the end; radial from the disco-cellular, a little distance above the end.

Allied to *Physula*, Gn., but distinguished by the tufted antennæ of the ♂, and the peculiar clothing of the under side of the fore wings.

23. *Physulodes eupithecialis.*

Physula eupithecialis, Gn., Delt. & Pyr., 87, 116; Wlk., Cat. Lep. Het. B. M., xvi., p. 141.

Fore wing sandy ochreous dusted with brown, especially along the costa and towards the hind margin; two fine dark but indistinct transverse lines, one before and one beyond the middle, the latter wavy; orbicular stigma hardly visible; reniform consisting of two spots; a submarginal row of distinct black spots; fringes concolorous, with a line of darker scales down their middle. Hind wing more thickly dusted with darker, with an indistinct interrupted darker central band, and a paler one towards the hind margin; the row of submarginal dots as in the fore wing. Under side straw-colour dusted with brownish; the submarginal row of dark spots very plain; fore wing with the disc and the base of the costa more or less overrun with very fine powdery-looking hairs. Head, palpi, thorax, and abdomen ochreous, dotted with brown atoms.

One ♂. Pupunha, R. Jurua, Nov. 1st, 1874.

There is no example of this insect in the British Museum collection, but it agrees well with Guenée's description. Differing as it does in the structure of the ♂ antennæ from the other two species of *Physula*, Gn., I have placed it in a genus by itself.

24. *Megatomis bidentalis*, n. s.

Fore wing fuscous, with a purplish reflection in certain lights, dusted all over with ochreous atoms; the lines and stigmata also ochreous; first line near the base indistinct, curved, edged with darker; second line beyond the middle straight, oblique, suddenly reflexed just before reaching the costa; it is edged internally with dark; submarginal line indistinct, ochreous, zigzag, forming two prominent angulations; orbicular stigma small, oblique, reniform stigma lunular, both with ochreous centres and dark margins; marginal lunules black; fringe fuscous, with a narrow ochreous basal line. Hind wing fuscous, dusted with ochreous over the inner half; the costal half plain; the second straight line and the

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zigzag submarginal line of the fore wings are reproduced in the hind wings. Head, thorax, and abdomen dull fuscous; antennæ and palpi rather paler towards their apex. Expanse of wings, 30 mm.

One ♂. Sapucaia Croca, R. Madeira, May 15th, 1874.

The under side is ochreous dusted with fuscous; fore wing with the inner margin broadly whitish; hind wing showing traces of two bands; both wings with distinct black central spots.

In the single specimen captured the right hind wing shows the markings of the fore wing both on the upper and under sides, while the left seems to be without them.

25. *Hipoëpa raptatalis.*

Bertula raptatalis, Wlk., Cat. Lep. Het. B. M., xvi., p. 164.

Gonitis pusilla, Butler, Ann. N. H., 1875, pt. 2, p. 405.

Two females, taken at light; one at Curimabá, R. Jurua, Dec. 30th, 1874; the other on the R. Javary, Dec. 3rd.

The third joint of the palpi of the ♂ is more pilose than in ♀, fringed to the end, and the tuft of long hairs is found only in the fore legs of the ♂. Mr. Butler's examples of *G. pusilla* were from Natal.

26. *Chabora nealcesalis.*

Megatomis (?) *nealcesalis*, Wlk., Cat. Lep. Het. B. M., xix., p. 883, ♀.

Chabora tauralis, Wlk., ib., xxxiv., p. 1185, ♂.

The indentation, which Walker mentions near the anal angle in the fore wing of the ♂, occurs only in that sex; it is repeated and exaggerated in the hind wings, of which the apex is also strongly rounded, while in the ♀, on the contrary, the apex is produced into a point. Fore wing cinereous, tinged with pink; markings fawn-coloured, deepening into brown; costa with six white dots; a pale brown basal line from the first, slightly angulated in the middle externally; from the second dot, in the ♂, there starts an oblique line, internally broadly brown-shaded and externally pale-margined, which runs to above the anal angle, where it turns and runs straight to the inner margin; contiguous to the centre of the oblique upper arm stands a triangular dark brown spot. In the ♀ this second line runs nearly straight across the wing to the inner

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margin some distance before the anal angle, and is followed along its lower half by a pinkish grey space. From the third white costal dot a curved brown externally pale-edged line runs to the middle of the wing towards the angle of the second line, before which it vanishes. Submarginal from the fifth white dot, very indistinct. In the ♀ the submarginal line is conspicuously distinct, denticulated, internally pale-edged, before which it is preceded by a broadish brown shade. In both sexes is a marginal line of lunules; fringes in ♂ grey, in ♀ whitish, with a double basal dark line. Hind wings in the ♂ whitish, pellucid, tinged with fuscous; dark fuscous along the hind margin; fringes whitish mixed with grey; in the ♀ entirely dark fuscous, darker still towards the hind margin; fringes mottled dark and light. Under side cinereous freckled with darker, with the apex of the fore wing diffusely, and all the margins of the hind wing concisely, bright orange-brown or brick-red; the lines in the ♀ very distinct. Head, face, and palpi rufous; the tips of the latter brown; thorax and abdomen grey and fuscous mixed; the last four or five segments yellowish above, each segment ringed with whitish.

Two males, Serta, April 21st, 1874, and one female, Fazinda, near the rapids of the R. Tapajos, March 14th, 1874.

Allied to *Sarmatia divisalis*, Wlk., xxxiv., p. 1131, from S. Africa (of which *Bertula subcupralis*, Wlk., xxxiv., p. 1167, from Natal, is a synonym), and also to *Rhæsena transcissa*, Wlk., xxxv., p. 1974, from Australia. I may here mention that, as the type of *Sarmatia* is *S. interitalis*, Wlk., a totally distinct insect from *S. divisalis*, and as further *B. subcupralis* is not a *Bertula*, the generic name *Rhæsena* must be adopted for the species, and the synonymy will be as follows:—

Rhæsena divisalis.
Sarmatia divisalis, Wlk., xxxiv., 1131.
Bertula subcupralis, Wlk., ib., 1167.

Parachabora, n. g.

Fore wing with a nearly straight costa, slightly concave along the centre; hind margin obliquely curved; hind wing rounded. Scaling fine and iridescent. Head and thorax more roughly and coarsely scaled; palpi with second joint long, erect, laterally compressed, rather broad; terminal joint short, blunt; tongue strongly developed; eyes large and prominent. Antennæ in ♂ finely pubescent beneath, each joint with two longer cilia; abdo-

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men in ♂ rather long, with anal tuft. Neuration: Fore wing, cell two-thirds the length of the wing; first subcostal at two-thirds of the cell, the next three on one stem starting from the upper angle of the cell, the second and third running short to the costa out of the fourth; the fifth, much curved at its origin, also from upper angle of the cell, upper radial from below the end; first median branch at two-thirds; second, third, and lower radial all close together, one above the other, at the lower angle. Hind wing: costal and subcostal united at the base, the costal then straight to the apex; the subcostal with two branches; first median branch only a short way before the end of cell; second and third on a short common stem from the lower angle; radial curved from the same point; disco-cellular invisible.

The genus has affinities with *Chabora*, Wlk., also from S. America, and with *Rhæsena divisalis*, Wlk., from S. Africa, and *R. transcissa*, Wlk., from Australia; while *Plusiodonta anartoides*, Wlk., xxxiii., p. 843, is still more closely related, but differs by its much longer palpi.

27. *Parachabora abydas.*

Noctua abydas, H.-S., Samml. Auss. Eur. Schm., ii., fig. 565.

Omiodes ? tortola, Feld., Reise Nov., pl. 120, fig. 9.

One ♂, R. Solimoes, near Santa Cruz, Dec. 9th, 1874.

Herrich-Schäffer's type, evidently a ♀, was from Venezuela; Felder's, a ♂, from French Guiana. I think there can be no doubt that both figures are intended to depict the same insect. In the absence of any previous description I append the following:—

Fore wing a mixture of pinkish and tawny, tinged in certain lights with violet and bronzy, especially towards the hind margin; all the markings very indistinct; the first line runs obliquely from the costa to the middle, then straight to the inner margin, the basal area enclosed being browner than the central, which is more pink, but with the two stigmata indistinctly tawny brown; second line fine, dark, a little denticulated and incurved below the reniform stigma; hind margin burnished, with the submarginal line faintly perceptible. Hind wing pearly white, with the veins towards the hind margin, and the hind margin itself broadly, fuscous, the latter fading off towards the anal angle. Fringes of fore wing dark bronzy; of the hind wing white. Palpi pinkish grey, the third joint darker; head and thorax and the anal tuft in the ♂ orange-tawny; abdomen greyish ochreous, paler beneath. Under side of

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fore wing dull fuscous; of hind wing whitish; both without markings. Expanse of wings, 27 mm.

28. *Egnasia dorcanderalis.*

Megatomis dorcanderalis, Wlk., Cat. Lep. Het. B. M., xix., 883.

One ♀. R. Purus, Sept. 30th, 1874.

Walker's type of the species is a ♂, with the antennæ pectinated; the ♀ has them crenulated.

29. *Egnasia* (?) *albipunctata*, n. s.

Fore wing pinky brown, with faint traces of a curved dark brown line before the middle, immediately followed by a small white orbicular stigma; a much serrated blackish line starts from the middle of the costa, is much bent outwards, and forms three sides of a square, enclosing the reniform stigma, which is large yellowish, and finally terminates in the middle of the inner margin; the space between this elbow and the reniform stigma filled up with dark brown; submarginal line hardly perceptible; a row of black dots before the fringes. Hind wing with traces of two darker bands, and the row of submarginal spots. Under side dull pinkish fuscous; without markings. Abdomen and legs concolorous. Head, &c., absent. Expanse of wings, 20 mm.

One ♀. R. Manhes, April 29th, 1874.

In the absence of the head, with all its organs, this insect can only provisionally be referred to *Egnasia*.

Rhododactyla, n. g.

Fore wings falcate, deeply concave below the apex, and with a prominent projection above the anal angle, in which the third median branch terminates. Hind wings square-cut with an angulation in the hind margin towards the inner angle. Forehead with projecting tufts of scales; antennæ minutely ciliated beneath; palpi drooping; second joint densely fringed and concealing the third. Femora and tibiæ of legs pilose. Neuration: Fore wing with a strongly-marked fold between the submedian and first median branch; second and third median branches and lower radial from the lower end of the disco-cellular; upper radial from the top angle of the cell; second, third, and fourth subcostal branches stalked, the second, very short, out of the third just before the apex. Hind wing: first median branch at two-thirds; second

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and third stalked from the lower end of the cell; radial from below the middle of the disco-cellular; cell divided longitudinally by a fold, which also reaches beyond the disco-cellular towards the hind margin; subcostal branches from the upper end of the disco-cellular; costal free.

30. *Rhododactyla elicrina.*

Colobochyla (?) *elicrina*, Feld., Reise Nov., pl. 120, fig. 17.

(?) *Achantodes semirosea*, H.-S., Samml. Auss. Eur. Schm., p. 68, fig. 454.

Fore wing pinkish, tinged with ochreous and grey; without distinct markings; the stigmata paler, roundish; the reniform large; an obscure dentate pinkish transverse line beyond the middle; five black submarginal spots, three in the upper concavity, two above the anal angle. Hind wing yellowish ochreous, darker towards the hind margin. Head, thorax, and palpi pinkish brown. Under side ochreous; the costa of both wings dusted with grey. Expanse of wings, 26 mm.

One ♂. Itatoro, R. Madeira, June 2nd, 1874.

The figure of Felder, which most certainly represents the present species, gives another transverse line before the middle, which, owing to its condition, cannot be made out in the specimen from Itatoro. Herrich-Schäffer's figure *may* be intended to depict a pale unmarked example, but more probably represents another species of the same genus. The latter author proposes to refer the genus to the *Notodontidæ*, as Mr. Butler has, in fact, referred the type-species, *Achantodes cerusicosta*, Gn., from Venezuela. The locality for *A. semirosea*, H.-S., was not known. Felder's *C. elicrina* was, like the present example, from the Amazons.

Dysglyptogona, n. g.

Fore wing with the costa abruptly curved at the extreme base, then straight, and only convex just before the apex, which is slightly produced and acute; hind margin concave below the apex and elbowed in the middle, thence running obliquely to the anal angle, which is itself bluntly elbowed. Hind wing with the costa strongly arched at the base, and very convex towards the apex, which is decidedly pointed; the hind margin, *in the* ♀, resembling that of the fore wing, *vis.*, falcate on the upper half and elbowed

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in the middle; *in the* ♂ sharply cut off straight from the apex to the anal angle. Palpi of ♂ very hairy; second joint long, obliquely ascending; third short, consisting of a double tuft, the base of which is hidden among the projecting scales of the second; tongue present; palpi of the ♀ shaped like the ♂, but with appressed scales, not hairy themselves, but concealed by the hairiness round them. Antennæ with two fine lateral bristles on each joint, densely and shortly pubescent beneath throughout; in the ♂ thickened out and flattened at the base. Head and face rough-haired; patagia in the ♂ remarkably long, upcurved and crested, reaching half-way down the abdomen; in the ♀ much less marked. Legs long and stout, with long spurs; all the femora hairy, especially in the ♂. Neuration: Fore wing, costal into the costa at quite three-quarters from the base; first subcostal branch at two-thirds of the cell, about the middle of the wing at about one-sixth before the end of the cell two branches rise from the same point, the upper one curving upwards, the lower running close alongside of, and scarcely distinguishable from, the subcostal itself to the end, then curving upwards, and uniting with the upper; from this point of conjunction the fifth subcostal branch runs straight to the hind margin some little way below the apex, and the fourth curves into the apex itself, emitting at one-third of its course the second, and the third just before its termination in the apex. Disco-cellular inwardly curved, scarcely angulated, with a strong recurrent vein, the cell itself long, extending nearly two-thirds of the wing; upper radial from a little below the top angle, lower from a little above the bottom angle of the cell; first median branch at two-thirds of the cell; second and third from the lower end; interno-median fold strongly expressed, and curved towards its base. Hind wing with the costal and subcostal anastomosing for a very short distance near the base, the costal thence running sinuously to the apex; the subcostal with two long branches; first median branch arising quite close to the base of the median; second and third short-stalked from the lower end of the cell; cell short and broad, with a well-marked free recurrent vein from the radial. On the under side the base of the costa and the basal portions of all the nervures beset with hairs, more especially in the ♀.

31. *Dyeglyptogona dissimilis*, n. s.

Fore wing ochreous, dusted all over with black-tipped scales; with three transverse brown lines, which are all more undulating in the ♂ than in the ♀; the first, near the base, forms a subcostal angulation pointing outwards, and then runs sinuously to the

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inner margin, more or less parallel to the hind margin in the ♀; after the subcostal angulation it runs straight; second line central, with a subcostal angulation similar to the first, and then running irregularly sinuous, more or less parallel to the first, but diverging from it on the inner margin; in the ♀ this line is nearly straight throughout, with a slight subcostal angulation *pointing inwards;* third line from the costa before the apex to the inner margin before the anal angle simply sinuous in the ♂, with a paler external edging; in the ♀ nearly straight; there are traces, in both sexes, of a zigzag submarginal line, and a submarginal row of black spots; in the ♂ the lower half of the second line is followed and that of the third line both preceded and followed by brown shading; a white-centred, dark-outlined spot obliquely below the subcostal angulation of the first and second lines, representing the two stigmata. Hind wing ochreous, dusted, like the fore wing, with dark-tipped scales; with a central, slightly curved brown line (which in the ♀ is geminated), a dark spot between it and the base; in the ♂ the apex is brownish, and in the ♀ the row of submarginal black dots is visible, but not in the ♂; abdomen dull ochreous mixed with grey; head, face, palpi, and thorax dull ochreous in the ♀, bright ochreous in the ♂. Under side dull ochreous, dusted with darker; with all the markings more or less showing through. Expanse of wings, 45 mm.

One ♀. R. Jurua, Oct. 27th, 1874; one ♂ from Juruapuca, R. Jurua, Nov. 11th, 1874.

The ♂ specimen is in better condition than the ♀, though both are without fringes. Notwithstanding the different configuration of the hind wings, and the dissimilarity in the markings of the fore wings of the two sexes, the peculiar identical neuration shows the two examples to be sexes of one and the same species. *Ensipia lamusalis*, Wlk., xvi, p. 208, is evidently related to it.

Erebostrota, n. g.

Fore wing with straight costa, becoming convex before the apex, which is blunt; hind margin curved, slightly scalloped, and faintly elbowed in the centre. Hind wing with costa straight; hind margin with a rather prominent angular projection below the costa, beneath which it is strongly indented, and then runs straight to the anal angle. Tongue present, patagia rather long, suberect (palpi and antennæ, as well as the abdomen, gone); legs with the tibiæ and femora densely hairy. Neuration: Fore wing, cell broad; disco-cellular angulated; the upper arm only half the

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length of the lower; first and second subcostal branches parallel, starting at about two-thirds and four-fifths respectively; third, fourth, and fifth on a short stem from the top angle of the cell, third out of the fourth shortly before the apex; upper radial from the upper angle of the cell; first median branch at two-thirds, strongly curved at its origin; second from lower end of cell, which is blunt; third from a little above, and lower radial from a little above this last. Hind wing: cell short and broad; costal and subcostal anastomosing near to base; costal thence straight, subcostal with two long branches from the upper end of cell; first median branch from near the base of the median; second from lower end of the cell; third and radial from a point a little above the second.

82. *Erebostrota albocincta*, n. s.

Fore wing ochreous, tinged slightly with fulvous, and overrun with fine sinuous fleckings of dark scales; the costal margin broadly black-brown, with a slight purplish tinge, and the nervures themselves showing blacker; the costa itself with ochreous patches and dots. First line very faint, brownish, with a white dot on the median and submedian nervures; second line beyond the centre angulated but indistinct, its course denoted by three whitish dots on the submedian and two lower median branches respectively, and by a broad oblique white dash above towards the apex; centre of the hind margin rather darker; a distinct black dot in the centre of the wing. Hind wing ochreous tinged with fulvous, and speckled with darker, with a minute dark dot in the middle; fringes ochreous only slightly chequered with darker. Under side: fore wing dull greyish ochreous, thickly dusted with darker, and with traces of two darker bands and two blackish spots towards the apex; the central dot of the upper side and the three angles of the cell also black. Hind wing pale straw-colour with dark frecklings, confined to the costa and hind margin; a black central spot; an indistinct central band, and a darker, more distinct, submarginal one; fringes ochreous, with strong black dashes at the ends of the nervures. Face and palpi ochreous; collar dark brown; patagia ochreous, with greenish-grey bases; abdomen ochreous; legs bright ochreous, with femora and tibiæ densely hairy. Expanse of wings, 44 mm.

One ♂. Laranjal, R. Manhes, May 3rd, 1874.

Triommatodes, n. g.

Fore wing broad; costa straight; hind margin slightly elbowed in the middle; hind wing rounded, broad, with the anal angle

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somewhat produced. Antennæ (of ♂) strongly pectinated, the pectinations themselves swollen towards their apex, and ending each in a fine bristle; all the pectinations so finely and closely ciliated as to appear almost membranous. Palpi laterally compressed, ascending, suboblique, twice as long as the head; third joint half the second, the tips of both blunt; tongue hairy; maxillary palpi invisible; forehead hairy; patagia well-developed, extending beyond the thorax; legs with the fore and middle femora (and probably the hind ones also) hairy.

33. *Triommatodes plumosa*, n. s.

Fore wing dull ochreous, with indications of three irregular curved transverse lines; the first near the base; the second before the middle, followed between the subcostal and median veins by a black patch; the third beyond the middle, preceded and followed below the costa by blackish shading, and followed only by a similar shading towards the anal angle. Hind wing with this dark blotch at the anal angle reproduced, and with two curved bands. Under side ochreous, with central dark dot. Head, face, and thorax ochreous; abdomen pale ochreous, with blackish anal tuft. Expanse of wings, 40 mm.

One ♂, from Gepatiny, R. Purus, Sept. 29th, 1874. The single specimen is in poor condition, and the markings can only be made out indistinctly.

Atopomorpha, n. g.

Fore wing very long and narrow; costa at base nearly straight, with a shallow concavity in the middle, and very convex at the apex; hind margin very oblique, sinuous, the upper half convex, the lower concave; the anal angle somewhat square. Hind wing broad; the costa strong, arched at the base and sinuous, like the fore wing, but more exaggerated; hind margin with a prominent blunt projection occupying the upper two-thirds, then sinuous to the anal angle, which is rather prominent. Abdomen very long and thin; the head with its organs is damaged; hind tibiæ with two pairs of spurs, the inner of each three times as long as the outer. Neuration: Fore wing, cell reaching quite three-fifths of the wing, its basal half underneath beset with hairs; first median branch from the centre of the cell; the second, third, and lower radial from the lower end of the cell; the third slightly arched, the radial considerably; upper radial from below the upper angle of cell; first subcostal branch from the middle; second just before the end; third, fourth, and fifth stalked, the fifth soon leaving the

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common stem, the third and fourth separating half-way. Hind wing: costal and subcostal uniting at a point close to the base, then diverging again; costal straight to the apex; subcostal with two branches; first median branch from before the centre; second and third from lower end of cell; disco-cellular very obscure; radial from its centre.

34. *Atopomorpha singularis*, n. s.

Fore wing pale ochreous, varied with grey, brown, and yellowish; a curved blackish line near the base more strongly marked on the inner margin; a sinuous oblique dark line beyond the middle, running nearly parallel to the hind margin, preceded by a broad brownish shade, and followed by a white line; all three more strongly marked on the inner margin; submarginal line narrow, whitish, sinuous, most distinct towards the costa, preceded and followed in its upper half by a brownish shade, preceded in its lower half by a sinuous, ochreous, curved blotch, and followed by a dark patch; a dark blotch at the apex, underneath which is a triangular ochreous-white spot; orbicular stigma yellowish, outlined with darker; reniform stigma hemispherical, with a darker centre. Hind wing grey-brown, darker throughout the basal half; the pale edging of the second line in the fore wing continued across the hind wing, but straight, not sinuous; hind margin dark fuscous towards the costa, towards the anal angle ochreous yellow mottled with darker, and with two dark brown patches. Fringes of both wings (apparently) ochreous mottled with darker; abdomen greyish ochreous, the segments darker. Under side whitish ochreous, dusted with yellowish; both wings with a dark central spot and fascia; the hind wing with a diffuse second fascia towards the hind margin, containing a darker blotch towards the anal angle; a series of marginal lunules before the base of the fringes more distinct than above. Expanse of wings, 30 mm.

One ♂, from Para, March 10th, 1875.

A very peculiar-looking insect, resembling in some respects a distorted *Macaria;* the junction of the costal and subcostal nervures of the hind wing near the base is likewise characteristic of the *Geometrina;* on the other hand, the presence of the two stigmata is more indicative of a Pseudo-deltoid. In the absence of all the mouth-parts, however, its proper position must be left undecided.

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PTEROPRISTIDÆ.

I propose this family to include all the species in which the hind margin of the fore wing is fissured, that is to say, the three genera, *Tortricodes*, Gn., *Gaberasa*, Wlk., and *Pteroprista*, n. g.

35. *Tortricodes alucitalis.*

Tortricodes alucitalis, Gn., Delt. & Pyr., 73, 92; Wlk., Cat. Lep. Het. B. M., xvi., p. 131.

One ♂, from Teffé, Oct. 18th, 1874.

As Guenée's single ♂ was in such bad condition that he was unable to give an exact description of it, I here append one, as well as a more detailed account of the structure and neuration of the genus (as derived from this species), which latter seems to me not quite correctly given by Guenée:—

Fore wing with costa straight for one-third, then excavated for another third, the cavity being filled up with a fringe of hairs, which projects a little beyond the costal outline; apical third strongly convex, almost elbowed, appearing, as Guenée expresses it, as if cut off with a pair of scissors; hind margin for one-third vertical, or even almost sloping outwards, then carved out, with a deep incision running inwards quite one-third towards the base, and curved upwards at its end, thus forming two lobes; the edges of the incision with fringes like the rest of the hind margin. Under side: Costa with a strong fold from the base fringed with long hairs, which extend also along the edge of the central concavity; the median vein is fringed with long hairs, which terminate in a raised funnel-shaped tuft before the upcurved end of the incision; hind wing rounded. Neuration: Fore wing with the costal nervure hidden under the fold, and forming beyond it the margin of the costal concavity; first subcostal branch starting half-way down the cell, just beneath the beginning of the costal cavity; second half-way between the first and the end of the cell; third, fourth, and fifth from a common stem just before the end; the fifth leaving very near the base of the stem; the fourth half-way towards the apex. Submedian running straight to the anal angle; interno-median fold strongly developed; first median branch at one-third before the end of the cell, strongly curved at its origin, and running into the top of the lower lobe; second just before the end, apparently running round the end of the incision, and terminating shortly on the inner margin of the front lobe; third median

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branch and lower radial curved, apparently from the same point at the end of the median; disco-cellular absent; upper radial from the end of the subcostal nervure, which is slightly bent downwards and running much further than usual from the costa. Hind wing with the costal and subcostal nervures united for a short distance at the base; subcostal with two branches; median with three branches; no transverse vein; the first and third median branches starting together from where the lower end of the cell should be; the second out of the third. Palpi very long, recurved, the last joint expanding internally into a brush; tongue strongly developed; maxillary palpi not visible. Antennæ short but stout, slightly swollen near the middle, and with the first joint enlarged; each joint with two long sharp-pointed lateral bristles, and finely but shortly pubescent beneath. Fore leg with the tibiæ and upper part of the tarsi roughly clothed with long hairs.

The genus is distinguished from *Gaberasa*, Wlk., and *Pteroprista*, with which it agrees in the incision in the hind margin of the fore wings, by the excavated costa and tuft of scales. Guenée enumerates four species, viz., *pterophoralis*, *alucitalis*, *orneodalis*, and *sueralis*, which appear to represent different degrees of departure from typical wing-form. Thus *P. sueralis* has no distinct incision in the hind margin, but only a simple indentation, and the costal cavity small and filled up with a fringe of hairs just level with the costal outline. *Alucitalis* has the incision strongly-marked, but the costal cavity small, with a fringe projecting slightly beyond the costal outline. In *orneodalis* and *pterophoralis*, besides the deep incision in the hind margin, the costa is strongly concave from the base, and the crest of hairs in the centre assumes a much greater prominence. It is worthy of notice that all the examples at present known of the three genera, *Tortricodes*, Gn., *Gaberasa*, Wlk., and *Pteroprista* are males.

The British Museum Collection at present possesses no species of *Tortricodes*. But besides the single ♂ of *T. alucitalis* here mentioned from the Traill collection, there is a single ♂ of *T. orneodalis* in the Zeller collection. *T. pterophoralis* and *sueralis* are still unrepresented. The Zeller collection also contains two perfect males of Walker's *Gaberasa ambigualis*. I now give the description of *T. alucitalis*, Gn. :—

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Fore wing dun-colour, with a slight purplish tinge; markings olive-fuscous; basal area pale, edged by an oblique line from the basal end of the costal cavity to the inner margin; this line is followed by a diffuse fuscous-olive shade; from the apical end of the costal concavity a sinuous, rather dentate, brown line runs just inside the end of the incision, while between the two lines is a slightly darker central shade; a dark spot of scales at the end of the incision; submarginal line curved, indistinct, but preceded by darker shading throughout; fringes concolorous, darker at their base. Hind wing dull fuscous, the margin faintly scalloped. Head, thorax, and abdomen all dun-colour. Under side paler, more ochreous, with greyish suffusion, the funnel of hairs somewhat ochraceous; hind wing dusted with dark grey, with a dark central spot and traces of three curved bands.

Pteroprista, n. g.

Fore wing with costa straight; hind margin obtusely angulated in the middle, and with a slit below the angulation, running in towards the base of the wing for about one-fifth of its length, the edges fringed like the hind margin itself. Hind wing rounded. Neuration: first and second subcostal branches running parallel to each other from about the centre of the subcostal; third, fourth, and fifth from the same stem, rising just before the end of the cell, the third out of the fourth half-way before the apex. Submedian to anal angle; interno-median fold strongly developed; first median branch at one-third before the end of the cell, running into the hind lobe; second from just before the end of the cell, curving upwards into the front lobe; third and lower radial from the same point at the end of the cell; upper radial from below the upper angle. Hind wing: Costal and subcostal united at the base for a short distance; subcostal with two branches, median with three; the second and third on the same stem. Palpi laterally compressed, long, recurved over the head, the third joint twice the length of the second, bluntly pointed; roughly scaled externally, internally clothed with long pale hairs, as in *T. alucitalis* and the genus *Berbula;* tongue well-developed; maxillary palpi absent. Antennæ thin, the joints angulated and finely pubescent, but without the two longer bristles that occur in *Tortricodes*. Legs with the base of all the femora hairy.

Akin to *Gaberasa*, Wlk., and *Tortricodes*, Gn., with an incision in the hind margin of the fore wings; differing, like *Gaberasa*, from *Tortricodes* by the absence of any costal concavity.

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36. *Pteroprista metallica*, n. s.

Fore wing pale liver-colour, with the markings darker; the tips of all the scales metallic; a faint brown sinuous line before the middle, and a straight oblique one beyond the middle, the latter preceded by diffuse brown shading, and followed by a more distinct broadish bronzy-purple shade; subterminal line slightly curved, brown, indistinct; fringe darker, with some black spots before their base. Hind wing without markings, except a trace of a curved submarginal line, forming a bronzy purplish patch at the anal angle; fringe darker with paler bases, preceded by darker dashes. Head, thorax, and abdomen dark fuscous; inside of palpi and anal tuft ochreous. Under side paler, somewhat ochreous, but withal metallic; fore wing without markings. Hind wing speckled with dark grey, with faint indications of a submarginal band, and a more conspicuous series of dark lunules before the fringe. Expanse of wings, 27 mm.

One ♂. R. Mamellos, R. Madeira, Jan. 6th, 1874.

Distinguished at once from *Gaberasa* and *Tortricodes* by the metallic scaling and pointed apex of the fore wing.

PYRALIDINA.

CHRYSAUGIDÆ.

In this family I also include the genera of Lederer's other two families, *Homalochroidæ* and *Semniadæ*, all the species of which are marked by the abnormal position of the first subcostal branch of the fore wings. It seems absurd to consider slight deviations in the direction of a single nervure adequate grounds for constituting separate *families*. Walker's genera *Dastira*, *Nachaba*, and *Arouva* must also be included: all the species are characterised by the very much elongated basal joint of the antennæ.

37. *Arouva mirificana*.

Arouva mirificana, Wlk., Cat. Lep. Het. B. M., xxx., p. 963.

Semnia egaealis, Feld., Reise Nov., pl. 134, fig. 19.

One ♀. R. Madeira, June 3rd, 1874.

Walker's type, a ♂, from Ega, is from Mr. Bates' collection. Felder's example, from the Amazons, was likewise from the same collection. The antennæ of the

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♂ are without the subapical tuft of scales which characterises the genus *Semnia*, to which Felder, judging from the superficial resemblance of the ♀, referred it.

There is a very peculiar characteristic in the ♂ which Walker seems to have quite overlooked. This is a raised lappet of scales running from the base of the fore wing along the subcostal nervure on the *upper* side.

Before proceeding to describe the next species I propose to discuss the constitution of Walker's genus *Locastra*. This genus comprises four species, described from males alone, and is characterised by similar antennal processes to those which occur in that sex throughout the *Epipaschiadæ*, of which family *Locastra* must certainly form a genus.

In his typical species *maimonalis*, Walker describes the palpi as "short, stout, ascending, closely applied to the head, densely clothed with squamose hairs"; and the legs as "stout, densely pilose." Now this description applies to none of the remaining three species: his second species, *phereciusalis*, is identical with *Stericta divitalis* (*Glossina divitalis*, Gn.), and his fourth, *haraldusalis*, which I have not seen, is most probably another *Stericta;* certainly not a true *Locastra:* the third, *sagarisalis*, in which he describes the costa of the fore wing as "notched and thickened at a little beyond the middle," evidently belongs to a separate genus of the same family, to which also must be referred *Stericta* (*Glossina*) *achatina*, Butler, from Japan. Of Walker's original four species of *Locastra*, there will therefore remain only the first, *maimonalis;* and even in this case the specific name must give place to another of Walker's own, for *Eurois* (?) *crassipennis*, Wlk., Cat. Lep. Het. B. M., xi., 558, is a ♀ of the same species.

EPIPASCHIADÆ.

38. *Locastra pilosa*, n. s.

Fore wings pale ochreous-yellow, with brown lines and markings; a small brown spot close to the base on the subcostal; before the middle a zigzag brown line approaching the base on the inner margin, followed about the centre by a dark dot, which stands in a small brown blotch; second line denticulated, starts from the middle of the costa, making a small sharp angle basewards, then running outwards for a short distance, and afterwards parallel to

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the hind margin, followed, after a narrow ochreous interval, by a broad indistinctly bordered brownish band; a row of dark brown spots along the hind margin, and four dark costal streaks before the apex. Hind wing more fuscous, without markings. Head, thorax, and legs all ochreous; abdomen the same, but dusted with brownish; palpi, antennal processes, and an erect tuft at the back of the thorax brighter ochreous, tinged with brown towards their extremities. Under side pale ochreous, dusted with fuscous, especially in the fore wing, which shows traces of the submarginal dark band near the costa; hind wing with distinct black central spot, and faint traces of two dark slender curved bands. Fringes probably ochreous, but the specimen is much worn along the margins of the wings. Expanse of wings, 28 mm.

One ♂. R. Javary, Oct. 5th, 1874.

Though considerably smaller than *Locastra crassipennis*, Wlk. (*maimonalis*, Wlk.), the peculiar pilosity of the legs and thorax, and the shape of the palpi, are enough to prove it congeneric.

39. *Locastra funerea*, n. s.

Fore wings ochreous, more or less suffused with fuscous, with three denticulate, transverse, dark lines, the first before the middle, the second beyond; these two dark edged with lighter; the third submarginal pale; a distinct dark spot at the end of the cell, and an obscure smaller one between it and the base; a row of strongly-defined black lunules along the hind margin; hind wing dark fuscous, without markings. Head, thorax, and palpi ochreous; abdomen fuscous. Under side dull ochreous, more or less mixed with fuscous, with a central dark spot on both wings, and on the hind wing faint traces of a central dark band and broader submarginal one. Expanse of wings, 28 mm.

Three specimens. One ♀, R. Javary, Dec. 7th, 1874; one ♀, R. Jutahi, above Curnem, Jan. 29th; and one ♂ from Santarem, R. Jutahi, Feb. 1st, 1875.

All three examples are in bad condition, neither having an antenna left, and, as might be expected, the antennal processes in the ♂ are gone. The amount of the fuscous suffusion seems to vary much: one ♀ has the whole wing dark; the other pair have only irregular isolated patches; the fringes and colouring of the head, palpi, and thorax vary according to the suffusion of the wings; thus giving the insects a very dissimilar appearance: the hind wing, however, is dark in all.

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40. *Homura nocturnalis.*

Homura nocturnalis, Ld., W. E. M., vii., p. 339, pl. 7, fig. 7.

One ♀, from the south bank of R. Negro, June 16th, 1874.

Lederer's type was a ♂; the ♀ is without any of the characteristics of that sex.*

41. *Deuterollyta conspicualis.*

Deuterollyta conspicualis, Ld., W. E. M., vii., p. 359, pl. 7, f. 16, 17.

One ♂, from R. Sapó, Dec. 13th, 1874.

PYRALIDIDÆ.

42. *Ugra parallela.*

Ugra parallela, Wlk., Cat. Lep. Het. B. M., xxvii., p. 189.

Fore wings entirely dull red, with two vertical yellowish lines, which exactly trisect the wing; fringe dull red, with yellowish apices. Hind wing ochreous-white, rather transparent, tinged towards the costa with reddish grey, but without markings. Head, thorax, and antennæ dull red; abdomen greyish. Under side pale pinkish grey.

One ♀, R. Javary, Dec. 1st, 1874, at light, in very poor condition; an unnamed brightly-coloured male example, but without a body, is in the British Museum Collection, from Espiritu Santo. This is properly placed among the typical *Pyralidina*. The position of *Ugra parallela* among the *Crambidæ* is, of course, erroneous.

43. *Hemimatia atramentalis.*

Hemimatia atramentalis, Ld., W. E. M., vii., pp. 347, 459, pl. 7, fig. 14.

Two females from Curimatá, R. Jurua, Oct. 30th, 1874.

44. *Anemosa* (?) *roseobrunnea*, n. s.

Fore wing glossy, semidiaphanous, varying from rosy-red to reddish brown, with two more or less distinct darker transverse

* This insect, I have since found, is not the ♀ of *H. nocturnalis*, but of the following species, *D. conspicualis*.

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lines, one before the middle simply curved, the other beyond slightly sinuous; a dark central dash between them at the end of the cell; fringe glossy, with the base darker, the extremities light, in some examples pearly white. Hind wing oleaginous, in the rosy-red specimens with the hind margin more or less broadly reddish; in the browner examples merely brown; sometimes also showing an obscure darker line near the anal angle; fringes as in fore wing. Head, thorax, and antennæ concolorous with the fore wings; abdomen more cinereous, with rosy or brownish anal tuft. Under side glossy yellowish, tinged with rosy or brownish; tongue, under side of abdomen, pectus, and legs pearly white; first joint of the fore tibiæ brown on the outside. Expanse of wings, 18—20 mm.

Eight males, taken, it would seem, more or less throughout the year: the first at Gepatiny, R. Purus, March 29th, 1874; the second, R. Madeira, May 17th, 1874; the third, Sept. 28th, 1874, at Mannia, R. Purus; the fourth from R. Javary, Dec. 7th, 1874; the fifth from Boaventura, R. Jutahi, Jan. 24th, 1875; the sixth from R. Jutahi, Jan. 27th, 1875; the seventh from R. Jutahi, near R. Curnem, Jan. 29th, 1875; and the eighth and last from Santarem, also on R. Jutahi, Feb. 2nd, 1875.

It seems strange that of a species thus taken on and off throughout the year no females should have been met with, nor any previous record of its occurrence be discoverable.

SICULODIDÆ.

45. *Iza nebulosa*, n. s.

Fore wing shining ochreous-grey, with darker markings forming a basal patch, the outer edge of which is most distinct towards the costa, but fades gradually away towards the inner margin. An angulated central fascia as in *I. nubecula*, but more indistinct, and an indistinct submarginal fascia; extreme apex paler, more glossy. Hind wing dark ochreous with darker reticulations, which in the centre become brownish, and form a disconnected fascia. Head, thorax, abdomen, and fringe dark ochreous. Under side pale straw-colour, with all the markings plainer. Expanse of wings, 45 mm.

Two males from R. Jutahi, near the mouth of R. Curnem, Jan. 29th, 1875, and one ♀ from Lages, mouth of R. Negro, Aug. 4th, 1874.

This species belongs to Guenée's ninth group, which

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Walker erected into the genus *Iza*. In his preliminary remarks on the family *Siculodidæ* in general, Guenée states (Ann. Soc. Ent. de France, ser. v., vol. 7, 1877) that they are entirely destitute of a frenum. This is certainly not the case. In the three specimens of *Iza nebulosa* it is quite plain and strongly developed, being, as usual in the ♀, divided into three branches. It is also present, though finer and less conspicuous, in the ♀ of *Siculodes rhomboidea*. In the fore wing the costal nervure is armed at its base with a large curved tuft of scales, but this is quite distinct from the loop further on, which is clear enough. Along the centre of the cell beneath is a double row of short, curved, glistening hairs.

46. *Siculodes rhomboidea*, n. s.

Fore wings glossy ochreous, mottled with darker, and with brown markings; these form two narrow curved fasciæ near the base, which coalesce on the inner margin; an irregular central fascia, narrow on the costa and inner margin, where it approaches the two basal fasciæ, broadening out into an angle towards the apex, where it joins an angulated narrow submarginal fascia; in it at its widest part are two or three brown flecks; extreme apex lighter. Hind wings ochreous with darker mottlings, with three irregular dark brown fasciæ, honeycombed with paler; in the paler space between the central and submarginal fasciæ is an isolated brown spot. Apex of the hind wing prominently blunt. Head, thorax, and abdomen mottled light and dark ochreous. Fringes dark. Expanse of wings, 32 mm.

One ♀. Laranjal, R. Manhes, May 5th, 1874.

The species belongs to Guenée's second group, in which the palpi are upcurved, the terminal joint fully as long as the second, erect and narrow, the top of the second joint even reaching as high as the summit of the head. The fore wings are narrow and elongated, and the hind wings have the apical angle prominently but bluntly produced, with the hind margin beneath it somewhat indented.

MARGARONIADÆ.

47. *Hoterodes nervosa*, n. s.

Fore wing white, semidiaphanous; with the nervures fuscous, and with some fuscous furry scaling along the nervures towards the base of the wing; costa broadly white to the apex; hind wing

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like the fore wing. Head, thorax, and abdomen all whitish. Expanse of wings, 44 mm.

One ♀ from Uananáa, north bank of R. Solomoens; R. Purus, Sept. 6th, 1874.

48. *Pachyarches lustralis.*

Margarodes lustralis, Gn., Delt. & Pyr., 306, 324.
Margaronia lustralis, Wlk., Cat. Lep. Het. B. M., xviii., 520.

One ♂ from R. Javary, Dec. 8th, 1874.

Walker seems to have confounded this species and *P. imitalis:* of the seven examples of this latter mentioned by him, four are really *P. lustralis.* This latter is larger than *P. imitalis* (38 mm. as compared with 28 mm.), and has glaucous-green fore wings, while those of *P. imitalis* are milk-white.

49. *Pachyarches aurocostalis.*

Margarodes aurocostalis, Gn., Delt. & Pyr., 305, 322.
? *Geometra costata*, Fab., E. S., iii., 2, 287.

One ♂ from Boa Ventura, R. Jutahi, Jan. 24th, 1875.

Guenée's type was from Guadaloupe; there are no examples in the British Museum Collection. The present specimen, which is in perfect condition, has the fore wing shot with shining grey, especially along the inner margin (where it is interrupted by a white spot), and along the hind margin and fringes of both wings; a small dark spot at the end of the cell; the marginal points of both wings black and distinct. With these exceptions the example answers well to Guenée's description.

50. *Hyalitis bajulalis.*

Hyalitis bajulalis, Gn., Delt. & Pyr., 291, 294.

Seven examples. Five males from R. Javary, Dec. 2nd and 4th; one male from R. Purus, Sept. 13th, 1874; and one ♀ from Serpa, Feb. 13th, 1875.

Guenée's types, a male and female, were from Cayenne.

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51. *Eudioptis emeusalis.*

Phakellura emeusalis, Wlk., Cat. Lep. Het. B. M., xviii., 513.

Nine specimens, all males. One from R. Madeira, May 24th; one from Guajaratuba, R. Purus, Sept. 11th; five from R. Jurua, Oct. 29th, Nov. 3rd, 5th, 7th, 8th; two from R. Javary, Nov. 30th and Dec. 3rd, 1874.

Walker's type, in Mr. Fry's collection, was from Rio Janeiro.

52. *Eudioptis nitidalis.*

Phalæna-Pyralis nitidalis, Cram., Pap. Exot., iv., 160, pl. 371, fig. F; v., pl. 22, fig. 10.

Nine specimens, all males. One from the west bank of R. Madeira, May 16th; one from Curimata, R. Jurua, Oct. 30th; one below Tabatinga, Nov. 28th; one from R. Javary, Dec. 2nd, 1874; three from R. Jutahi, Jan., 1875; and two in February from the same locality.

53. *Eudioptis exclusalis.*

Phakellura exclusalis, Wlk., Cat. Lep. Het. B. M., xxxiv., p. 1361.

One ♂ from Itatoro, R. Madeira, June 2nd, 1874.

The specimen in Mr. Birchall's collection, from which Walker made his description, was from Bogotá.

54. *Eudioptis lucidalis.*

Eudioptis lucidalis, Hüb., Verz. Schm., 359, 3440.

Two specimens, both males. One from Jamiry, R. Madeira, May 28th, and one from R. Javary, Dec. 2nd, 1874.

55. *Eudioptis latilimbalis.*

Phakellura latilimbalis, Gn., Delt. & Pyr., 296, 301.

Twelve specimens, all males. Four taken on R. Madeira, May 24th, 1874; two on its tributary, R. Marmellos, June 1st; three on R. Jurua, Oct. 29th; one on the R. Javary, Dec. 2nd; and two on the R. Jutahi, Jan. 25th, 1875.

Guenée's type was from Brazil; this also was a ♂. There are no examples in the British Museum Collection.

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56. *Eudioptis hyalinata.*

Phalæna-Geometra hyalinata, L. S. N., iii., 2, 873, 279.
Phalæna-Pyralis marginalis, Cram., Pap. Exot., iv., 160, pl. 371, fig. D; v., pl. 22, fig. 9.
Phakellura gigantalis, Snellen, Tijd. v. Ent., 1875, p. 234, pl. 13, figs. 7, 8.

Four examples. Three males from Fonte Boa, R. Solomoes, Nov. 16th, 1874, Manhes, April 27th, 1874, and Hyntanaham, R. Purus, Sept. 28th, 1874, respectively; one female from P. m. de Salois, April 19th, 1874.

Snellen's *gigantalis* appears to be merely a large form with narrower band to the hind margin. The fifth example in the British Museum Collection (marked *h* in Walker's Catalogue) from the West Coast of S. America is this variety, and the ♂ above mentioned from Fonte Boa is another.

57. *Eudioptis arguta.*

Phakellura arguta, Ld., W. E. M., vii., pp. 401, 478, pl. 13, fig. 15.

Two specimens, both males; that from Tunantins, Nov. 23rd, 1874, the other from Lages, Jan. 1st, 1875.

Lederer gives N. America as a locality. Snellen, Tijd. v. Entom., 1875, p. 232, records two males taken in January, 1871, near Puerto de Ocaña, on the R. Magdalena.

58. *Glyphodes sibillalis.*

Glyphodes sibillalis, Wlk., Cat. Lep. Het., B. M., xviii., p. 506.
G. Batesi, Feld., Reise Nov., pl. 135, fig. 29.

Four males. One from Jamiry, R. Madeira, May 28th, 1874: one from Itatoro, on the same river, June 2nd; one from Ilha das Araras, June 3rd; and one from R. Javary, Dec. 8th.

Felder's specimen is a ♀ from the Amazons; in the note to the figure are the words "very much like *G. sibillalis*, Wlk." To me it seems identical.

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ZEBRONIADÆ.

59. *Zebronia perspicata.*

Phalæna perspicata, Fab., Mant., ii., 213, 240.
Spilomela perspicalis, Gn., Delt. & Pyr., 280, 273; Ld., W. E. M., vii., p. 442.
Zebronia perspicalis, Wlk., Cat. Lep. Het. B. M., xvii., 471.
Phalæna-Pyralis strigialis, Stoll, pl. 12, fig. 7.

One ♂. Near the mouth of R. Jurua, Nov. 14th, 1874.

60. *Zebronia ledalis.*

Zebronia ledalis, Wlk., Cat. Lep. Het. B. M., xvii., p. 474.

One ♂ from Pupunha, R. Jurua, Oct. 1st, 1874. Walker's types were from Ega.

The species is evidently closely allied to *Zebronia* (*Ochlia*) *pantheralis*, Hüb., Zutr., iv., 20, 337, figs. 673, 674, from N. America; but the ground colour of this last is given as straw-yellow.

Zebronia phenice = *Phalæna-Pyralis phenice*, Cram., Pap. Exot., iv., 185, pl. 382, fig. G. = *Zebronia fœderalis*, Hüb., Verz., 361, 3456 = *Spilomela phenicealis*, Gn., Delt. & Pyr., 281, 275 = (?) *Spilomela podalirialis*, Gn., Delt. & Pyr., 281, 274, seems entirely to have escaped Lederer's observation, though it forms the type of Hübner's *Zebronia*. I see no reason why this name should not be restored to the genus in place of Guenée's far more modern *Spilomela*.

61. *Synclera jarbusalis.*

Samea jarbusalis, Wlk., Cat. Lep. Het. B. M., xvii., p. 352.

Four males, R. Madeira, May 26th, 1874; one female, R. Javary, Dec. 6th, 1874: all at light. Walker's types are from St. Domingo.

Very closely allied to *Synclera traducalis*, Z. = *Glyphodes univocalis*, Wlk., which occurs in S. Africa, Syria, and Hindostan; but this last has the pale spaces along the hind margin and the segments of the abdomen pearly white.

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62. *Conchylodes bunusalis.*

Zebronia bunusalis, Wlk., Cat. Lep. Het. B. M., xix., 967.

One ♀. Boa Ventura, Jan. 24th, 1875; at light. Walker's types were from Rio Janeiro.

63. *Leucochroma minoralis*, n. s.

Fore wings pearly white, with the extreme base yellow; three subcostal dark-edged yellow spots, the second and third representing the two stigmata, and obliquely below them, and nearer the base, three others, forming with the upper series three interrupted fasciæ; a blackish spot obliquely below the reniform stigma, followed by two diffuse yellow curved fasciæ, the inner one of which is bifurcate towards the costa. Hind wings pearly white, with a central abbreviated dark-edged yellow band, an internally dark-edged yellow submarginal fascia, bifurcate at the apical angle; a fine yellow line at the base of the fringes. There is no trace of a dark denticulated submarginal line, such as occurs in *L. splendidalis*, and it is about one-third smaller. Head and thorax white, dusted with yellow; abdomen whitish, yellow at the sides. Expanse of wings, 19 mm.

One ♀, of which the locality and date are both illegible.

64. *Homophysa sulphuralis.*

Phalæna-Pyralis sulphuralis, Cram., Pap. Exot., iv., 113, pl. 348, fig. E.

Homophysa sulphuratalis, Gn., Delt. & Pyr., 365, 448.

One ♀. Itatoro, R. Madeira, June 2nd, 1874.

Lederer made a separate family, *Homophysidæ*, to include this genus and *Scybalista*, solely because the first subcostal branch of the fore wing is not free, but rises out of the second. This single peculiarity in neuration hardly seems sufficient reason for forming a new *family*, adequate though it may be for *generic* distinction.

DESMIADÆ.

65. *Desmia lauralis.*

Salbia lauralis, Wlk., Cat. Lep. Het. B. M., xvii., p. 358.

Two males taken at light. One at Lages, Jan. 5th,

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1875; the other at Miriti, on the River Madeira, May 21st, 1874.

The antennæ of the ♂ show this insect to be a true *Desmia*.

66. *Salbia pellucidalis*, n. s.

Wings semidiaphanous, ochreous-white, with pale olive-brown shading, deepening into purple towards the base and hind margin. Fore wings at the extreme base bronzy purple; before the middle a thin dark curved line, before which on the inner margin the wing is whitish hyaline; second line beyond the middle forms two curves and a rounded projection externally between them, is interrupted before reaching the anal angle, and terminates near the centre of the inner margin underneath the dark lunular cellular spot; beyond the second line are oval hyaline spots between the nervules, and one before and another below the cellular spot. The space between the lines is suffused with olive and brown, the costa itself being fulvous; the whole apical region is bronzy purple, darker before the purplish fringes. Hind wings hyaline, with a broad olive fascia near the base, a narrower broken one beyond, and the hind margin broadly olive, black at the anal angle; fringe whitish, with a dark basal and medial line. Head and thorax dark olive-brown; abdomen fulvous, the two first segments pale, the last segment with two narrow white streaks; under side of abdomen and legs white. The above description applies to the ♂; the ♀ is smaller and darker, without the brown and olive tints. Expanse of wings, ♂ 24, ♀ 20 mm.

Three males, R. Madeira, May 26th, 1874. A ♀ from Espiritu Santo, unnamed, is in the British Museum Collection.

67. *Salbiomorpha ancidalis*.

Salbiomorpha ancidalis, Snellen, Tijd. v. Ent., 1875, xviii., p. 216, pl. 12, figs. 11, 12.

One ♂. Itatoro, R. Madeira, June 2nd, 1874.

Easily distinguished by the peculiar fold on the *inner margin* of the ♂ fore wing.

Crocidocnemis, n. g.

Fore wing with the costa curved throughout; apex rounded; hind margin obliquely curved; hind wing triangular, the anal and apical angles rather prominent. Antennæ short, thick, laminated, strongly pubescent beneath; palpi short, diffusely scaled, hardly

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projecting beyond face; terminal joint invisible; tongue present; legs stout and strong; abdomen with dark anal tuft, and with a flock of black hairs at the base of the hind femora. Neuration: Fore wing with the costal and first subcostal branch very long; second, third, and fourth on a common stem rising from the upper angle of cell; second and third short and very oblique; upper radial curved at its base, also from the angle of the cell; first median branch at four-fifths; second and third from lower angle of cell; lower radial just above them, submedian strongly forked at base. Hind wing: Costal suddenly bent in middle towards the subcostal, then curving away again, with two short branches; subcostal simple; first median branch at two-thirds; second, third, and radial, one above the other near the lower angle of cell.

68. *Crocidocnemis pellucida*, n. s.

Fore wing sand-coloured, dusted with brownish along the costa and hind margin, and in the basal area with three short semi-hyaline transverse fasciæ, which do not reach the costa, and widen out and more or less unite along the inner margin; orbicular stigma before the centre, flattened between the subcostal and median veins, with curved darker lateral edges; beneath it and contiguous just such another spot between the median and submedian, these both preceded and followed by a narrowish hyaline space; reniform stigma very broad, trapezoidal, its edges darker, and with a broader hyaline fascia beyond it and below it, traversed by one or two slender brown lines; towards the inner margin is a short brown line, and beyond it a brownish blotch; four darker spots on the costa before the apex. Hind wing with the basal half more or less hyaline, with a brown central spot, two sinuous brown lines, and a sandy brown hind margin. Palpi white beneath, brownish above; thorax and abdomen mixed sandy and whitish; anal tuft dark. Under side of wings glossy ochreous, the markings faintly visible. Expanse of wings, 30 mm.

One ♂. Pupunha, R. Jurua, Nov. 1st, 1874.

Related to *Samea*, but distinguished by its larger size, rounded costa and apex, and by the tuft of hairs attached to the base of hind femora.

69. *Hymenia perspectalis*.

Pyralis perspectalis, Hüb., Exot. Schm., Pyral., fig. 101.

Zinckenia perspectalis, Ld., W. E. M., vii., p. 437.

One ♀. Miriti, R. Madeira, May 21st, 1874.

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70. *Œdiodes sepulchralis.*

Desmia sepulchralis, Gn., Delt. & Pyr., 190, 123.

One ♂, without any notice of locality or date, and in very poor condition. It differs from the other species of *Œdiodes* by the smallness of the first hyaline spot, which Guenée calls comma-shaped. His type, a ♀, was from Cayenne. Lederer seems to have ignored the species altogether. The ciliated antennæ, without the nodosity of *Desmia*, prove it an *Œdiodes*.

71. *Lamprosema lunulalis.*

Lamprosema lunulalis, Hüb., Zutr., ii., 21, 152, figs. 303, 304; Moeschler, Surinam, iv., p. 40 (430).
Asopia lunulalis, Gn., Delt. & Pyr., p. 205; Wlk., Cat. Lep. Het. B. M., xvii., p. 368.
Œdiodes (?) *lunulalis*, Ld., W. E. M., vii., p. 434.
Desmia pelealis, Wlk., *l. c.*, xvii., p. 338.
D. canacealis, Wlk., *l. c.*, xvii., p. 342.
Botys dorisalis, Wlk., *l. c.*, xviii., p. 616.
B. codrusalis, Wlk., xviii., *l. c.*, p. 616.
B. œnippealis, Wlk., *l. c.*, p. 619.

One ♀, R Jutahi, Jan. 31st, 1875; in poor condition. In the British Museum Collection there are five examples of *Desmia pelealis*, three of *Botys*, and one unnamed without abdomen, but otherwise very perfect, from Espiritu Santo.

The type of Walker's *D. canacealis* differs slightly from *L. lunulalis*, the upper surface being more mottled with fuscous, and all the wings having a more strongly-marked marginal metallic line; the white costal spot at the base of the second line is much more visible on the under side, but I doubt if it is really distinct. In fresh specimens of *L. lunulalis* the second line is followed, especially on the hind wing, by a lustrous metallic band.

72. *Samea ecclesialis.*

Samea ecclesialis, Gn., Delt. & Pyr., 194, 132.
S. castellalis, Gn., Delt. & Pyr., 195, 133.
S. disertalis, Wlk., Cat. Lep. Het. B. M., xxxiv., p. 1302.
S. discessalis, Wlk., ib., xxxiv., p. 1302.

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One male, Jamiry, R. Madeira, May 26th, 1874, at light; six females, Fáro, April 11th; Saviao, R. Jurua, Nov. 10th; R. Madeira, May 16th, 1874.

Walker says of *S. castellalis* that it is hardly distinct from *S. ecclesialis*, and that *S. discessalis* is very near to *S. disertalis*. The only difference is in the size and extent of the pale spots, owing to the greater or less diffusion of the darker tints.

MEGAPHYSIDÆ.

73. *Agathodes monstralis.*

Agathodes monstralis, Gn., Delt. & Pyr., 209, 165.
A. designalis, Gn., ib., 209, 166.

Two males. One from Obydos, March 8th, 1874; one from R. Javary, Nov. 30th, 1874: both at light.

Guenée gives N. America for *A. monstralis*, Brazil and N. America with a query for *A. designalis*. The *A. designalis* in the British Museum Collection is from Mexico, the *A. monstralis* from the United States and St. Domingo. The only difference seems to be in the narrower white costal streak of *A. designalis*, but this is merely relative.

Lederer, without any reason, substitutes the name *Stenurges* for *Agathodes*, because Guenée had already used *Achatodes*.

*74. *Leucophotis lybialis.*

Botys lybialis, Wlk., Cat. Lep. Het. B. M., xviii., p. 624.
B. amatalis, Wlk., ib.

One ♀. R. Jurua, Nov. 7th, 1874.

Mr. Butler established the genus *Leucophotis* for a species of comparatively large size (49 mm.), *L. pulchra*, from Fiji. This appears to be distinctly related to the genus *Leucinodes* by the neuration, the ground colour, and the markings of the wings; and notwithstanding

* The location of this species in the genus *Leucophotis* I have since found to be incorrect: it should probably form the type of a separate genus intermediate between *Aphytoceros*, Meyr., and *Azochis*, Walker.

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the pectinated antennæ, I cannot hesitate to refer to it the present species, *Botys lybialis*, Wlk., and the next succeeding species, *B. amatalis*, Wlk., which is certainly the same. The greater development in the constitution of the antennæ is not uncommon in conjunction with an increase in the size of an insect; indeed, there is an example in the British Museum Collection, at present not named, of an insect which approaches *L. pulchra* in size, and has the antennæ subdentate, forming an intermediate link between *L. pulchra* with its decided pectinations, and *L. lybialis* with its simply laminated antennæ. The species referred to is from Goya, in the Argentine Republic. Another unnamed and still smaller species, from Burmah, is probably referable to this genus also.

75. *Leucinodes imperialis.*

Leucinodes imperialis, Gn., Delt. & Pyr., 223, 186.

One ♂. Obydos, Feb. 14th, 1874. Guenée's type was from Hayti.

76. *Leucinodes discerptalis.*

Leucinodes discerptalis, Wlk., Cat. Lep. Het. B. M., xxxiv., p. 1313.

One ♀. Cararaucu Lake, April 18th, 1874.

The type in the British Museum Collection is from Limas, Honduras.

Deuterophysa, n. g.

Fore wing about twice as long as broad, with the costa for the most part straight, but suddenly convex before the apex, which is slightly but bluntly produced; hind margin faintly indented below the apex, and bulging out above the anal angle. Antennæ short, thick, laminated, as in *Lepidoceras*. Palpi damaged, but apparently the same as in *Cyclocausta*. Neuration: Fore wing with the first median branch starting from the median before the middle of the wing, second from about the middle; third and fourth from the same point, at the same distance beyond the second as that is from the 1st. No disco-cellular. A little beyond the middle of the wing the subcostal is swollen, and from the swelling the first, second, and fourth subcostal branches rise one after the other; the third short, running out of the fourth before the apex. Above the

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swelling the costa itself is somewhat thickened, while below it there is a bladdery semihyaline space, across which the two radials can be seen running, and apparently uniting within the usual cellular space. Hind wing: Costal with two short branches; subcostal running very close to it, and having a single branch; median nervure curved; the first median branch starting before the middle of the wing; second about the middle; just beyond this last point a nervure is thrown back in the direction of a small bladdery space, which appears to correspond with that on the fore wing; third and fourth median branches short, from a long stalk.

In shape, coloration, and markings of the wings, as well as in the form of palpi and antennæ, the genus *Deuterophysa* corresponds well with *Adena*, Wlk.; but the neuration is totally distinct. In *Adena* the cell of the fore wing reaches to quite two-thirds of its length, and the disco-cellular is well-marked and vertical; in *Deuterophysa*, on the other hand, the cell is short, barely extending to half the wing, with the disco-cellular indistinct and oblique, the third subcostal branch and lower radial being stalked. *Adena sericea*, Butler, from Japan, corresponds more closely in the matter of neuration with *Deuterophysa*, having, like it, a very short cell, but the third subcostal branch and lower radial are not stalked. At all events, its position will be near *Adena*.

Walker's only species of *Adena* (for it is but one species, though he gave it three names, viz., *Scopula* (?) *paronalis*, xviii., 797, *Scopula hybreasalis*, xviii., 797, and *Adena xanthialis*, xxvii., 198) is from New Zealand, and varies considerably.

Mr. Butler, Ann. N. H., 1879, pt. ii., p. 451, alters Walker's name *Adena* into *Deana*, to avoid any clashing between it and *Hadena;* and Mr. Meyrick (Trans. Ent. Soc. Lond., 1884, p. 330) sinks it altogether, and substitutes *Nesarcha:* I must own that I cannot see the necessity for either alteration or substitution.

77. *Deuterophysa costimaculalis*, n. s.

Fore wing dull fawn-coloured, without markings; a pale yellow spot on the costa just beyond the middle, and below it an oblique pear-shaped white blotch, without scales, but edged with darker; fringes, as far as can be made out, whitish. Hind wing whitish, with darker hind margin. Head, thorax, and abdomen fawn-

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coloured. Under side of fore wing dull fawn, of hind wing whitish. Expanse of wings, 17 mm.

One ♂ from Bóa Vista, R. Jutahi, Feb. 1st, 1875.

The only specimen is unfortunately much damaged, but the peculiar swelling of the subcostal vein and the semihyaline space below are good characteristics.

Cyclocausta, n. g.

Fore wings narrow, nearly three times as long as broad, with the costa straight, the hind margin oblique. Antennæ short, thick, laminated, the joints overlapping each other above and smooth, but finely angulated beneath. Palpi porrected, drooping, the second joint thickly clothed with hairs, the terminal joint thin and nearly bare, but they are somewhat denuded in the solitary specimen in the collection, and when intact probably resemble *Leptosteges*. Maxillary palpi short, feathery. Scaling of wings fine and thin. Neuration: Fore wing, interno-median fold visible towards the hind margin; first median branch leaving the median at about the middle of the wing, the second a little beyond, the third lower radial still further, the latter forming the continuation of the median, which is slightly undulated in the middle; no disco-cellular discernible; first subcostal branch starting from the subcostal before the middle; the fourth and fifth from the same point where the upper angle of the cell should be; the second and third, one after the other, out of the fourth; radial free from the upper part of the disco-cellular region. Hind wing: Costal free, with two short branches; subcostal closely approximating, if not quite anastomosing, with a single branch; no visible disco-cellular; first median branch from before the middle of the wing; second from about the middle; third and radial beyond from the same point; the radial as in the fore wing, forming a curved continuation of the median.

78. *Cyclocausta trilineata*, n. s.

Fore wing white, slightly shining, with a dark brown costal streak, which thins out towards the apex; hind margin and two transverse lines parallel to it brown. Hind wing white, with the last three markings of the fore wing repeated. Head, thorax, and abdomen white; palpi brownish. Under side clear white. Expanse of wings, 18 mm.

One ♂ from the R. Jutahi, near R. Curnem, Jan. 1st, 1875.

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The only specimen is so much worn that only a partial description of it can be given.

It is a well-known fact that the use of the term *Botys* for a genus of *Pyralidina* has been all along an error, the type of *Botys*, as ultimately restricted by Schrank himself, being the Geometer now known as *Lythria purpuraria*. This being the case, no good can be done by perpetuating the blunder. Mr. Moore, in his work on the Insects of Ceylon, vol. iii., has adopted, from Hübner's 'Verzeichniss,' the generic name *Hapalia* as a substitute for *Botys*, and it will, I think, avoid confusion if we call the family *Hapaliadæ*.

HAPALIADÆ.

PHOSTRIA, *Hüb.*

This genus was placed by Hübner, along with *Thyris*, next to the *Sesiæ*. Although this position was wrong, the name of the genus will stand for a group of *Pyralidina*, for which I herewith give the following diagnosis:—

Fore wing narrow, elongate, the costa two-thirds as long again as the inner margin; costa straight till shortly before apex, where it becomes suddenly convex. Apex acute; hind margin very oblique, with a slight elbow in the middle, which is also reproduced in the hind wing; fore wings with three rows of dull white semi-diaphanous spots; hind wing with two rows. Palpi short, rounded, not reaching above the eyes; first joint beneath white; second triangular, ascending, concolorous with the fore wing; third joint very minute, blunt. Tongue well-developed, scaly at base; face smooth, forehead rough; patagia rather long, extending beyond thorax. Antennæ simple, finely pubescent. Femora and tibiæ hairy inside; all the tarsi and the middle tibiæ white. Neuration: First, second, and third subcostal branches apparently all free, and running closely parallel to each other; fourth and fifth from end of cell; first median branch near the end of cell, second from the end, third and lower radial close together, a little above the lower end of cell; upper radial from a little below the upper end; internal vein curving round, and forming a loop by coalescing with the submedian. Hind wing: Costal bent, with two branches; subcostal approximating to costal in the middle, then divergent; first median branch one-fifth before the end of cell, second only just before it; third along with the radial from the lower angle of cell.

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79. *Phostria temira.*

Phalæna-Pyralis temira, Cram., Pap. Exot., iv., p. 160, pl. 371, fig. E.

? *Hyalitis temira*, Gn., Delt. & Pyr., p. 289.

? ? *Glyphodes temiralis*, Wlk., Cat. Lep. Het. B. M., xvii., 507.

Wings reddish; fore wing with a minute yellowish blotch at the end of the cell, and six hyaline white spots; one basal between the median and submedian; three central, two of irregular shape, one above the other, and a minute one obliquely outside them; three submarginal, one large and two small, obliquely below it. Hind wing with two irregular curved hyaline blotches; in the space between them are two smaller yellowish blotches, and a single *white* spot; fringes of both wings white, chequered with dark towards the centre. Under side purplish pink, with the costa, central, and apical region yellowish. Head, palpi, thorax, and abdomen concolorous; anal tuft ochreous; under side of the abdomen, together with the tarsi, creamy white.

One ♂ from R. Curnem, a tributary of R. Jutahi, Jan. 29th, 1875.

Akin to *Botys* (?) *oajacalis*, Wlk., xxxiv., p. 1393, and to *B. pelialis*, Felder, Reise Nov., pl. 135, fig. 46, both from Mexico, in which also the under side of the abdomen and all the tarsi are snowy white. Akin also to *Phalæna-Pyralis tedea*, Cram., iv., p. 48, pl. 312, fig. G, of which there are two unnamed examples in the British Museum Collection from Duenas, Guatemala; but this, though having the tarsi white, has the under side of the abdomen dark brown, like the ground colour of the wings.

80. *Phostria persiusalis.*

Botys persiusalis, Wlk., Cat. Lep. Het. B. M., xviii., p. 623.

Two females. One from R. Jutahi, Jan. 31st, 1875; the other from S. Antonio, R. Negro, July 5th, 1874.

Walker's type was from Rio Janeiro, and is in Mr. Fry's collection. There are no examples in the British Museum.

Besides the two species here mentioned as occurring in this collection, there are several others which must

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be included in the same genus, of which it may be useful here to give briefly the names and synonymy :—

Phostria tedea.

Phalæna-Pyralis tedea, Cram., iv., p. 48, pl. 312, fig. G.
Desmia (?) *tedea*, Ld., W. E. M., vii., p. 433.
Hyalitis (?) *tedea*, Gn., Delt. & Pyr., p. 289.
Glyphodes ? tedealis, Wlk., Cat. Lep. Het. B. M., xvii., 506.
Phostria tedea, Möschler, Surinam, iv., p. 40 (430).

Habitat. Surinam. Two examples in the Brit. Mus. Collection.

Phostria oajacalis.

Botys oajacalis, Wlk., Cat. Lep. Het. B. M., xxxiv., 1393.

Habitat. Mexico. One specimen in the Brit. Mus. Collection.

Phostria pelialis.

Botys pelialis, Feld., Reise Nov., pl. 135, fig. 46.

Habitat. Mexico.

Phostria confluentalis, n. s.

Habitat. Rio Janeiro. One example in the Brit. Mus. Collection.

81. *Astura elevata.*

Phalæna elevata, Fabr., E. S., iii., 2, 216, 325.
Astura elevalis, Gn., Delt. & Pyr., 319, 345.

One ♀. Pupunhazinho, R. Jurua, Nov. 8th, 1874.

The examples in the British Museum Collection are from Para and Ega.

82. *Omiodes leporalis* (?).

Omiodes leporalis, Gn., Delt. & Pyr., 357, 428.

One ♀. Prainha, Nov. 11th, 1873.

The example is very much worn : owing to this circumstance, and the fact that there is no example of Guenée's insect in the British Museum Collection, I can only make a probable identification. The shape of the fore wings is evidently that of an *Omiodes*.

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83. *Eulepte concordalis.*

Eulepte concordalis, Hüb., Exot. Schm., i., B. 1; Möschler, Surinam, iv., 38 (428).

Botys concordalis, Gn., Delt. & Pyr., 345, 399; Wlk., Cat. Lep. Het. B. M., xviii., 608; Ld., W. E. M., vii., p. 375.

Phalæna-Pyralis socialis, Sepp., Surinam, iii., pl. 114.

Botys gastralis, Gn., Delt. & Pyr., 346, 400; Wlk., Cat. Lep. Het. B. M., xviii., 570.

Acrospila gastralis, Ld., W. E. M., vii., p. 392, pl. 13, fig. 5.

Botys ogmiusalis, Wlk., Cat. Lep. Het. B. M., xviii., p. 317.

One ♂ from Obydos, March 8th, 1874.

Guenée's types—two females—of *B. gastralis* were from Haiti and Guadaloupe; of *B. concordalis*—one male, two females—from Brazil: he himself says *B. gastralis* is closely allied to *B. concordalis*, but is larger, expanding 35 mm. in contrast to the 27 mm. of *B. concordalis*. The single example of *B. gastralis* in the British Museum Collection is, like Guenée's, from St. Domingo; those of *B. concordalis* from Venezuela, Ega, and Villa Nova. The locality for *B. ogmiusalis*, Wlk., was not known.

According to Möschler, *l. c.*, Lederer himself, though in his treatise he had separated the two species, subsequently reunited them in the Vienna Museum.

84. *Trithyris fenestrinalis.*

Trithyris fenestrinalis, Ld., W. E. M., vii., p. 410.

Botys fenestrinalis, Gn., Delt. & Pyr., 341, 389, pl. 5, fig. 8.

Three examples. One ♀, R. Jurua, Nov. 3rd, 1874, and a pair from Gaviao, also on the R. Jurua, Nov. 10th.

Guenée's two females were from Brazil, as was Walker's male. Guenée's description gives a far more exact idea of the species than Walker's.

85. *Microthyris sectalis.*

Botys sectalis, Gn., Delt. & Pyr., 353, 421.

Microthyris scotalis, Ld., W. E. M., vii., p. 353.

One ♀, from Lages, at the mouth of R. Negro, Aug. 5th, 1874. Guenée's type, a ♂, was from Brazil.

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The genus was instituted by Lederer, and characterised by the peculiarly produced anal angle of the hind wing in the ♂.

86. *Microthyris prolongalis.*

Botys prolongalis, Gn., Delt. & Pyr., 353, 420, ♂.
B. eurytalis, Wlk., Cat. Lep. Het. B. M., xviii., p. 576, ♂.

One ♀, from Pupunhazinho, Nov. 8th, 1874.

Guenée's male was from Brazil. The three males in the British Museum Collection, which form the types of Walker's *B. eurytalis*, are from Jamaica and St. Domingo. The descriptions both of Guenée and Walker apply, of course, only to the males. In the females the hyaline spots are much larger and more conspicuous, and the course of the lines can be clearly traced. In both sexes the palpi are unicolorous fuscous. In *M. sectalis*, on the other hand, they are distinctly parti-coloured.

DIASTREPTONEURA, n. g.

Fore wing short, broad, triangular; costa strongly arched at the base, slightly concave before the middle and convex before the apex, which is rounded; hind margin and inner margin forming a single curve, almost semicircular, with a slight indentation before the anal angle. Hind wing narrower, with the centre of the hind margin produced, but rounded off. Antennæ long, strongly pubescent beneath; palpi ascending, smooth, compressed; third joint short, blunt, not rising above head; tongue present; abdomen in ♂ with a long tuft of hair. Scaling glossy. Legs stout, with femora and tibiæ hairy. Neuration: Fore wing, costal thin to the middle of the costa; subcostal strongly developed; first subcostal branch at one-half of the cell, the other four on one stem rising from the upper angle of the cell; the fifth leaving the stem a little above the angle, the second and third starting from the fourth about the middle; first median branch at two-thirds of the cell, running sharp down into the anal angle; second and third from lower angle of cell, the second running parallel to the first; radials from the disco-cellular, the upper a little below the upper, the lower a little above the lower, angle of the cell. In the lower half of the cell, about half-way, the membrane of the wing beneath is puckered and raised, and a strong fold runs longitudinally from it through the cell, thence between the lower radial and upper median branch to the hind margin, before which it is suddenly deflected

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downwards; median vein swollen, with a glossy tuft of scales near the base; submedian very stout, running near the inner margin; interno-median fold distinct, the membrane puckered and distorted along its course. Hind wing with the cell short and broad; disco-cellular angulated internally; costal free; subcostal with two long branches; first median branch just before the end of the cell; second and third on a short common stem from the end; radial from the angle of the disco-cellular; a similar fold to that on the fore wing through the cell to the hind margin.

87. *Diastreptoneura distorta*, n. s.

Fore wing glossy ashy grey, spotted and varied with blackish, especially at the base of the wing, and in the middle of the costa. There are also traces of darker transverse sinuous lines, but the fore wings in both examples are denuded of scales to such an extent that an accurate inspection of the markings is impossible. Fringes shining grey, with a series of long dark lunules at their base; three or four whitish spots along the costa before the apex. Indistinct traces of a pale zigzag submarginal line beyond a dark costal blotch. Hind wing entirely dark grey, with the series of dark lunules before the fringes. Under side shining cinereous, without markings. Head, thorax, and abdomen cinereous, mottled with darker; antennæ wholly dark. The scales of the fore wing are broad, and appear as if attached in more or less vertical lines. Expanse of wings, 24 mm.

One ♂ from R. Jurua, Nov. 6th, 1874, and another from Gaviao, on the same river, Nov. 10th.

Distinguished by the peculiar shape of the fore wings, as well as by their distorted neuration. Its position will be near *Phryganodes plicatalis*, Gn.

88. *Pilocrosis amissalis*.

Botys amissalis, Gn., Delt. & Pyr., 351, 415, ♂.
B. agavealis, Wlk., Cat. Lep. Het. B. M., xviii., p. 574, ♀.
? *B. lysanderalis*, Wlk., ib., xviii., 603, ♂.
Pilocrosis ramentalis, Ld., W. E. M., vii., p. 430, pl. 16, fig. 13.
P. amissalis, Ld., ib.

Two females. R. Madeira, May 24th, 1874.

These two examples are not in quite so good a condition as Walker's type of *B. agavealis*, and another

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specimen in the British Museum Collection from Espiritu Santo, and as a consequence, the white edgings of the dark lines are more conspicuous. The species will probably prove a variable one: I am not sure that Lederer's *Botys pruinalis*, W. E. M., vii., pp. 373, 469, pl. 9, fig. 6, is not the same insect. Walker's type of *B. agavealis* was from St. Domingo, from Mr. Tweedie's collection.

Lederer had not seen Guenée's *B. amissalis*, and it seems to me that there is but little difference between Guenée's description of that species and Lederer's own *figure* of *P. ramentalis*. It should be noted that Lederer gives no real detailed description of *P. ramentalis*. Lederer again was unacquainted with the ♀ of either species, but a comparison of the palpi of Walker's *B. agavealis* with those of his (*B.* ?) *lysanderalis* shows them to be identical. The ♀ is somewhat more densely scaled, and the basal line is quite plain, not being obscured, as in the ♂, by the basal fold and scales. Besides the example from Espiritu Santo above mentioned, there is a second ♀ from the same place, of rather smaller size, and in poorer condition. I have quoted Walker's synonym, *lysanderalis*, with a query, because his description does not tally either with our present species or with the example from Venezuela, which is placed in the British Museum Collection under that name. It is possible that Walker described *B. lysanderalis* from specimens from Rio Janeiro, and subsequently, thinking that he identified the specimen from Venezuela in Mr. Dyson's collection, placed it in the cabinet accordingly.

89. *Prænesta scyllalis.*

Botys scyllalis, Wlk., Cat. Lep. Het. B. M., xviii., p. 566 (1859).
B. delicatalis, Ld., W. E. M., vii., 376, 473, pl. ii., fig. 10.
Prænesta fabialis, Snellen, Tijd. v. Ent., 1875, xviii., p. 220, pl. 12, figs. 15, 16.
P. sinualis, Snellen, ib., figs. 17, 18.

One ♂. Tunantins, Nov. 23rd, 1874; at light.

Snellen's specimens were taken in January on the R. Magdalena. The type in the British Museum Collection

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is from Mexico. There are also three more—one male, two females—unnamed in the same collection from Espiritu Santo.

Var. *castanealis.*

Wings deep fulvous-brown, the lines and markings indistinctly darker; head, thorax, and abdomen concolorous; the last segment with a large blackish anal tuft and two smaller lateral ones. In size, shape, and markings exactly like *Prænesta scyllalis*, of which I take it to be a brown suffused variety. Snellen's figures of *P. fabialis* and *P. sinualis* would then represent intermediate forms.

One ♂. R. Javary, Dec. 4th, 1874.

90. *Acharana phæopteralis.*

Botys phæopteralis, Gn., Delt. & Pyr., 349, 409.
Acharana phæopteralis, Moore, Ceyl., iii., p. 285.
? *Botys siriusalis*, Wlk., Cat. Lep. Het. B. M., xviii., p. 563.
? *B. dicealis*, Wlk., ib.
B. vestalis, Wlk, ib., p. 579.
? *B. plebejalis*, Ld., W. E. M., vii., 373, 469, pl. 10, fig. 8.
B. griseolis, Snell., Tijd. v. Ent., 1875, xviii., p. 198, pl. 11, f. 8.

Nine specimens. One ♀ from Manaos, Jan. 6th; one ♂ from R. Tapajos, March 16th; one ♂ from R. Manhes, May 1st; two females from R. Madeira, May 16th; two females from Ilha das Araras, June 3rd; one ♀ from Gaviao, on R. Jurua, Nov. 10th, 1874; and one ♂ from Santarem, R. Jutahi, Feb. 4th, 1875.

Of *B. phæopteralis* Guenée says, "Common throughout *Central* America" (Walker erroneously translates it *Southern*); Walker's *vestalis* were from Jamaica. Lederer, in the W. E. M, vii., p. 373, puts forward *B. plebejalis*, but at p. 469 withdraws it, as being only a dark form of *B. phæopteralis*, which he states occurs also in the East Indies, "probably introduced there by ships." Mr. Meyrick, Trans. Ent. Soc. Lond., 1887, p. 230, would make *B. licarsisalis*, Wlk., from Borneo, a synonym of *B. phæopteralis*, Gn.; but it seems to me that Mr. Moore, in his 'Ceylon,' vol. iii., p. 285, is right in considering

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that the insect called *B. phæopteralis* by Mr. Meyrick is identical with *B. otreusalis*, Wlk., occurring in Africa, Hindostan, and Borneo, and not with *B. phæopteralis*, Gn.; but *B. licarsisalis*, Wlk., from Borneo, should be added as a synonym. This is probably Lederer's imported East Indian species; *B. siriusalis*, Wlk. (of which *B. licealis*, Wlk., seems to be only a faded example), from N. America and St. Domingo, and his *B. plebeialis*, from Honduras, are both nearly-allied forms, but may be distinguished from *B. phæopteralis*, the former by the darker more opaque scaling, and large diffuse reniform stigma, as well as by the strongly-marked dark band and stigma on the under side; the latter by its much smaller size and yellow-brown tint, and by the ochreous outer margin of the exterior line. I have, however, marked *B. siriusalis* and *B. licealis* as *possibly synonyms* of *B. phæopteralis*. In fact, the only real difference between the species occurring in the Old World and in America seems to be in the larger size of the former, and we must wait for a knowledge of their larval states before finally accepting their identity or distinctness.

91. *Hapalia spoliatalis.*

Botys spoliatalis, Ld., W. E. M., vii., pp. 375, 473, pl. 11, fig. 8.

One ♂. R. Jutahi, Feb. 5th, 1875; at light.

Lederer's type was from N. America. As it was a ♀ he could make no mention of the dark anal tuft, which is very conspicuous in the ♂. Also the under side of the palpi, thorax, and abdomen are distinctly and strikingly whitish.

92. *Hapalia cernalis.*

Asopia cernalis, Gn., Delt. & Pyr., 203, 152.
Lygropia ? cernalis, Ld., W. E. M., vii., p. 381.

One ♂. R. Javary, Dec. 8th, 1874; at light.

The specimen in the British Museum Collection is from Villa Nova.

93. *Hapalia principialis.*

Botys principialis, Ld., W. E. M., vii., pp. 375, 471, pl. 10, fig. 17.

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Closely allied to *Botys cernalis* (*Asopia cernalis*, Gn.), which Lederer had not seen, but placed with a (?) in his genus *Lygropia*. *B. cernalis* has paler yellow more transparent wings; a pale-centred, dark-bordered, reniform stigma, and a fine dark marginal line running parallel to the basal line of the fringes all round both wings. In *B. principialis* this marginal line becomes nothing more than an irregular shade, the reniform stigma is wholly black, and the lower half of the second line is wavy.

One ♀. R. Jutahi, Feb. 2nd, 1875. Lederer gives N. America for habitat.

94. *Hapalia pyrenealis.*

Botys pyrenealis, Wlk., Cat. Lep. Het. B. M., xviii., p. 580, ♀.

B. medonalis, Wlk., ib., xviii., p. 599, ♂.

Three specimens, all males, in good condition. One from R. Purus, Sept. 9th, 1874; one from R. Javary, Dec. 8th, 1874; and one from R. Jutahi, Jan. 21st, 1875.

Walker's *B. pyrenealis* was from St. Domingo, and his *B. medonalis* from Honduras.

In the fresh specimens the two transverse lines are very faintly perceptible, and the white markings, especially along the hind margin, more vivid.

95. *Hapalia superbalis.*

Botys superbalis, Wlk., Cat. Lep. Het. B. M., xxxiv., p. 1397.

B. incalis, Snellen, Tijd. v. Ent., 1875, xviii., p. 202.

Three specimens. One ♀ from R. Madeira, May 26th, 1874; one ♂ from R. Purus, Sept. 15th; and one ♀ from R. Jurua, Nov. 6th.

Walker's type was from Cuenca, from Mr. Frazer's collection. Snellen's three males were taken Jan. 25th, 1871, near Conejo, R. Magdalena.

96. *Hapalia fatualis.*

Botys fatualis, Ld., W. E. M., vii., p. 475, pl. 11, fig. 15.

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One ♀. R. Jutahi, above R. Curnem, Jan. 24th, 1875.

Very closely allied to *Botys* (*Samea*) *ebulealis*, Gn., Delt. & Pyr., 196, 136, but with only the yellow fascia beyond the exterior line reaching the costa. Also akin to *Botys matutinalis*, Gn., and *B. adipalis*, Ld., but much smaller than either.

97. *Hapalia pallidipennis*, n. s.

Fore wings semihyaline, whitish, with a faint yellowish tinge, with the costa concisely and the hind margin broadly and diffusely bronzy grey; the lines brownish; the first curved, the exterior slightly denticulated, but not bulging outwards in the middle of its course as in *B. detritalis*. A very strong brown lunular mark on the disco-cellular, and a minute dot immediately beyond the first line representing the orbicular stigma. Hind wings like the fore wings, bronzy grey along the hind margin, with a distinct central brown spot, and the exterior line of the fore wings repeated. All the fringes with a bright line at their base, followed by a darker one, beyond which they are lighter, and in the hind wings white. Head, thorax, abdomen, and legs whitish ochreous; abdomen with a darker ochreous anal tuft, the last segment wholly blackish above, the two preceding segments blackish only at the sides; the second segment with a black dot above. Under side of the abdomen glossy white. Expanse of wings, 25 mm.

One ♂, from R. Jurua, Nov. 7th, 1874.

Very closely related to *B. detritalis*, Gn., but purer white, without the yellowish colouring; also to *B. rhipheusalis*, Wlk., from Borneo.

98. *Hapalia sublutalis*, n. s.

Wings greyish ochreous, with a pale bronzy or purplish tinge; semihyaline; the ochreous scaling denser along the costa, inner margin, and hind margin, the latter also greyer; fringes concolorous, shining. There are no clear markings of any kind, but a short basal and a curved exterior line are sometimes faintly perceptible, and there is a darkening above the disco-cellular, but not a distinct spot. Head, thorax, abdomen, and legs ochreous, glossy; in the ♂ the anal tuft contains some darker hairs. Under side without markings, glossy ochreous-grey. Expanse of wings, 33 mm.

Six examples. Three males and three females; the

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former from Cachocirimbo, R. Madeira, May 17th, Itatoro, R. Madeira, June 2nd, and Pupunha, Nov. 11th, 1874; the latter from R. Madeira, May 16th, R. Jurua, Nov. 7th, and R. Javary, Dec. 6th, 1874.

The species bears great superficial resemblance to *Botys illutalis*, Gn., but the eyes and legs are not dashed with white, nor have the wings a submarginal dark line; besides which the palpi are curved, ascending, not porrected. In this respect it approaches *B. belialis*, Wlk., from Villa Nova, but that is more yellowish, and has white legs.

There is also an unnamed example in the British Museum Collection from Espiritu Santo.

99. *Hapalia pactolalis.*

Botys pactolalis, Gn., Delt. & Pyr., 346, 403.

Seven examples, all males. Three from R. Madeira, May 17th, 21st, and 24th, 1874; one from R. Marmellos, a tributary of R. Madeira, June 1st; one from Itatoro, also on R. Madeira, June 2nd; one from Curimata, on R. Jurua, Oct. 30th; and one from the same river, Nov. 3rd.

Guenée's types came from Guadaloupe. There are no examples in the British Museum Collection.

100. *Hapalia inanitalis.*

Botys inanitalis, Ld., W. E. M., vii., pp. 371, 460, pl. 9, fig. 3.

One ♀, from Mabidiry, R. Purus, Sept. 30th, and another from Gaviao, R. Jurua. Nov. 10th, 1874.

Lederer gives Amboina, in the East Indies, as habitat; so that, if the identification be correct, the species must be one of wide distribution.

101. *Hapalia damonalis.*

Botys damonalis, Wlk., Cat. Lep. Het. B. M., xviii., p. 617.

One ♀, from Caruraucu, April 18th, 1874.

The types in the Saunders' collection are from Villa Nova.

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102. *Hapalia elathealis.*

Botys elathealis, Wlk., Cat. Lep. Het. B. M., xviii., p. 615.

Three females. One from Aramia, R. Purus, Oct. 4th, the others from the R. Jurua, Oct. 31st, and Nov. 26th, 1874.

Walker's type, in Mr. Saunders' collection, also came from the Amazons district.

103. *Hapalia sylvialis.*

Botys sylvialis, Wlk., Cat. Lep. Het. B. M., xviii., p. 615.

One ♀, from Serpa, April 22nd, 1874.

The type, in Mr. Saunders' collection, came from Brazil.

104. *Hapalia vitrealis*, n. s.

Wings white, diaphanous, with the veins darker. Expanse of wings, 36 mm.

Two males. R. Jutahi, Jan. 24th, 1875; Feb. 5th, 1875.

105. *Hapalia flavidensalis*, n. s.

Fore wing rather glossy, densely scaled; deep yellow, rather darker or more densely scaled along the costa and hind margin; the veins slightly darker; the curved inner line and denticulate outer line, together with the reniform stigma, only just discernible; hind wing paler, with only the hind margin yellow, and a very faint trace of a submarginal line. Head, thorax, and abdomen yellowish ochreous; palpi very short; middle tibiæ largely developed, broadly white laterally. Under side pale shining yellow; the fore wing with both stigmata clearly marked; *fringes all yellow*. Expanse of wings, 35 mm.

One ♀. Gepatiny, R. Purus, Sept. 30th, 1874.

106. *Hapalia expansalis.*

Botys expansalis, Ld., W. E. M., vii., pp. 376, 474, pl. 11, fig. 12.

? *B. opalisans*, Feld., Reise Nov., pl. 135, fig. 28.

Fore wing pale yellowish brown towards the base and along the inner margin, darker brown with a slight iridescent purplish

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tinge towards the hind margin; the costa, especially along the centre of the wing, broadly ochreous-yellow; a black transverse line close to the base; a second nearly straight before the middle, starting from a black spot on the costa, which interrupts the pale costal streak; the exterior line also starting from a black costal spot, curving outwards for one-third, then forming three teeth, running in basewards along the first median branch, and then reaching the inner margin as a broader curve; orbicular stigma brown edged with darker, quadrangular in shape, with a minute whitish spot between it and the second line; under it another roundish brown spot, also preceded by a paler one; reniform stigma kidney-shaped, with dark margin and ochreous centre, followed by two whitish patches; between the two stigmata, and also broadly below them, the wing is pale ochreous-white, semi-hyaline; the exterior line is followed by two subcostal oval patches of the same colour, one beneath the other, and is edged with paler throughout its course between each vein. Fringe glossy grey, chequered with darker, with a paler basal line, which is itself preceded by a row of nearly contiguous dark dashes. Hind wing rather sparsely scaled, fuscous, with the costa pale; a central dark dash and an indistinct denticulate submarginal line; fringes as in fore wing. Under side glossy, pale straw-colour, with all the markings neatly and darkly conspicuous. Palpi ochreous with the tips of all three joints dark brown. Thorax, patagia, and abdomen greyish ochreous; abdominal segments whitish; the penultimate and ante-penultimate segments with a streak of black. Legs ochreous; the fore legs with dark brown spots at the joints of the tibiæ and tarsi. Antennæ finely pubescent.

Two males. R. Madeira, May 16th, 1874.

Lederer's description is from a ♀, habitat unknown. As the sexes appear to differ slightly, and a few points are not noticed by Lederer, I have given a full description of the ♂. Felder's figure of *B. opalisans*, from St. Domingo, may possibly also be intended to represent the present species.

107. *Anania florella.*

Phalæna Tinea florella, Cram., Pap. Exot., iv., p. 114, pl. 348, fig. 4.

Syngamia florellalis, Gn., Delt. & Pyr., 187, 118.

Anania quinqualis, Hüb., Zutr., iii., 27, 176, figs. 351, 352.

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One female and three males. The female from R. Madeira, May 26th, 1874; the males from R. Madeira, May 26th, Serpa, April 22nd, R. Manhes, May 2nd, 1874.

108. *Hyalea aurantiacalis*, n. s.

Wings bright orange; fore wings with the costa and hind margin narrowly bronzy purple, and a straight fascia beyond the middle and wider on the costa of the same colour; this fascia contains a spot of the yellow ground colour just below the costa, and a smaller one on the inner margin; also at the base of the bronze costal streak is a small yellow dash; a minute bronzy spot lies contiguous to the costal streak in the middle. Hind wing with a broad curved bronzy border, traversed throughout by a narrow yellow band. Head, thorax, and abdomen yellow, the latter with the penultimate segment and one or two rings before it dark. Under side yellow, with all the markings reproduced; the costal dot is isolated; sides of the tibiæ bronzy fuscous. Expanse of wings, 18 mm.

Two males near Porto Salvo, R. Purus, Oct. 3rd, 1874, and one male at Gepatiny, R. Purus, Sept. 26th, 1874; all at light.

109. *Epichronistis* (?) *albiguttalis*, n. s.

Fore wing yellow, tinged with brown at the base, along the costa, and hind margin; a brown nearly vertical line near the base, preceded by a faint whitish spot; a brown, double-curved, submarginal line running inwards along the first median branch, and curving again into the inner margin just beyond the middle; this line is edged externally by a series of semicircular white blotches lying between the veins, which are followed by a brown shade that fades away into the yellow ground colour before the fringes; the three stigmata all large, roundish, distinct, brown-edged; a white spot between the orbicular and reniform stigmata. Hind wing yellow, without any brown suffusion; with the submarginal line exactly reproduced, and with a large brown central spot. Under side shining whitish, with the markings showing through. Head and thorax pale yellowish; abdomen darker yellow, the incisions of the segments whitish. Extreme tip of the palpi brown. Fringes of both wings, as far as can be made out, yellowish spotted with brown. Expanse of wings, 20 mm.

Three females. One from Boa Vista, one from Pariti, Oct. 5th, 1874, and one from Guajaratuba, Sept. 12th, 1874; all on R. Purus.

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STENIADÆ.

110. *Crochiphora testulalis.*

Crochiphora testulalis, Hüb. (Geyer), Exot. Schm., iv., 12, 315, figs. 629, 630.
Stenia testulalis, Gn., Delt. & Pyr., 247, 230.
S. testulalis, Wlk., Cat. Lep. Het. B. M., xvii., p. 420.
Maruca aquatilis, Wlk., Cat. Lep. Het. B. M., xvii., p. 540.
Siriocauta testulalis, Ld., W. E. M., vii., p. 424.

Eighteen specimens, of which fourteen vary more or less in one particular from the examples in the British Museum Collection, having the orbicular stigma elongated and amplified, so as almost to touch the smaller spot beneath. In the other four specimens, and in those in the British Museum Collection, the orbicular stigma is truncated basewards, and separated from the smaller spot by an appreciable interval of dark ground colour. The costa of the hind wing is dark, with two black spots, and there is a single wavy-brown transverse line across the centre. Lederer omits to mention either of these points in his description of *Siriocauta testulalis*, but as he calls the hind wings and the hyaline patches of the fore wings *pale yellow*, his specimen was in all probability greasy, and the markings more or less effaced.

The species appears to be of general distribution: coming from the Punjaub and Ceylon in India; from Borneo; from the Congo, in Africa; from Moreton Bay, in Australia; and from a variety of localities in South America.

Of the eighteen specimens contained in the Collection, sixteen are females. One male and one female from Aveyros, March 14th and 17th; one female from Faro, April 10th; seven females from R. Madeira, May 24th and 26th; one female from San Bonté, R. Negro, June 16th; five females from R. Jurua, Oct. 23rd, 24th, and 29th; one male from R. Javary, Nov. 30th; one female from Santarem, Feb. 2nd, 1875. In these fresh specimens the markings of the under side are much more vivid, and the hyaline patches iridescent pinkish.

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111. *Sozoa obscura*, n. s.

Fore wing rather shining, dingy grey, without any markings, except an obscure dark spot at the end of the cell; hind wing a little darker; fringes concolorous; head, thorax, and abdomen grey; legs paler; under side of abdomen paler; pectus silvery white; under side of wings shining grey, with an indistinct dark central spot on each, and a curved exterior line. Expanse of wings, 20 mm.

One ♂. Pupunha, R. Jurua, Nov. 5th, 1874.

The only other species at present named is Walker's original type, *Sozoa costalis*, from Bogota and Venezuela, which in appearance mimics a *Margaronia;* there is a third species in the British Museum Collection unnamed from Espiritu Santo, which superficially very much resembles Lederer's *Bradina selectalis*, from Amboina. So, too, the present species must be very much like *Hymenoptychis sordida*, Z., from Caffraria; but the structure of the antennæ and the neuration are quite different.

112. *Blepharomastyx colubralis.*

Stenia colubralis, Gn., Delt. & Pyr., 242, 216.
S. colubralis, Wlk., Cat. Lep. Het. B. M., xvii., p. 418.
Botys electralis, Wlk., ib., xviii., p. 601.

One ♂ from Pupunha, R. Jurua, Nov. 5th, 1874; one ♂ from Lake Arapecu, R. Trombetas, March 2nd, 1874.

Guenée's types of *S. colubralis* were from Cayenne, Walker's, of *B. electralis*, from Ega.

Leptosteges, n. g.

Fore wing nearly three times as long as broad; costa slightly convex throughout; hind margin oblique; anal angle rounded off; hind wing also narrow, with both angles rounded off. Scaling of wings thick and coarse, not glossy; markings alike on both. Eyes large; antennæ of the ♂ smooth above and pale, beneath with each joint angularly produced, and finely but densely ciliated throughout with brownish hairs. Palpi porrected, slightly ascending, clothed with diffuse rough hairs, which entirely conceal the joints, as in *Cledeobia*. Maxillary palpi slight, feathery; tongue feeble; legs long; first joint of the tarsi of the fore legs thickly clothed with dark hairs. Insects of small and delicate build. Neuration: Fore wing with the interno-median fold strongly expressed

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throughout, running parallel to the submedian into the hind margin above the anal angle; the disco-cellular angulated, so that the end of the cell is wedge-shaped; first median branch from the middle of the wing; second from the lower angle of the cell; third and fourth from the angle of the disco-cellular; second and third subcostal branches short, out of the fourth, which ends in the apex; fifth and radial from the upper angle of the cell. Hind wing with the cell remarkably short, the end wedge-shaped; first median branch a little before the end, second from the lower angle, third and fourth from the angle of the disco-cellular; subcostal branch from the upper angle; costal free, with two branches.

113. *Leptosteges pulverulenta*, n. s.

Fore wing whitish, diffusely dusted with brownish atoms, especially beyond the second line; with two transverse brown lines; the first at one-third, curved, and somewhat indistinct; the second distinct, broad, straight, running obliquely from the costa before the apex to the anal angle; costa brown half-way from the base. Hind wing white, with the markings of the fore wing repeated, but the first line represented only by a small brown dash, the second strongly expressed, the brown dusting beyond it still thicker than in the fore wing. Fringes whitish, dotted with brown. Head, thorax, and abdomen whitish; palpi brown; antennæ whitish above, but brownish underneath; legs whitish, but the fore tarsi brown outside. Under side whitish; in the fore wing more or less suffused with pale brown. Expanse of wings, 16 mm.

One ♂ with the date and locality obliterated.

A small and delicate species, quite unlike any other in the scaling and markings.

ASOPIADÆ.

114. *Asopia acestealis*.

Samea acestealis, Wlk., Cat. Lep. Het. B. M., xvii., p. 352.

Salbia phærusalis, Wlk., ib., xvii., 368.

One ♀, R. Javary, Dec. 3rd, 1874, and one ♂, Araras, Nov. 15th.

Walker's two types, both males, are from St. Domingo; another example in the British Museum Collection from Espiritu Santo, also a ♂, agrees with them. The two specimens above recorded are paler and clearer yellow, the dark shading being less expressed.

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Asopia moninalis, Wlk., from Borneo, is a closely-allied form; and *Samea medealis*, Wlk., from St. Domingo, and *Samea commixta*, Butler, from Japan, must also belong to the same genus.

115. *Pterygisus flavalis*, n. s.

Fore wings straw-colour, with bright fulvous or orange shading, and dark fuscous lines; an orange fascia close to the base, dark grey on the costa; a fulvous fascia before the middle, followed by a double blackish transverse line; a black-edged pale streak from the costa, pointing towards the anal angle, before the apex, and a pale dark-edged reniform mark; submarginal line dark, parallel to the hind margin, followed by a fuscous marginal band before the fulvous fringes, which have a dark basal line. Hind wings with the markings of the fore wings repeated and intensified, the fulvous and dark markings being all more distinct. Head, thorax, and abdomen ochreous, mottled with yellowish, the latter ringed with yellow. Expanse of wings, 12 mm.

Three females from R. Jutahi, Jan. 21st, and Feb. 4th, 1875.

Akin to Guenée's *P. ochropteralis*, Delt. & Pyr., 230, 250, or possibly identical; but Guenée's description was made from one imperfect specimen.

116. *Synclita gurgitalis*.

Synclita gurgitalis, Ld., W. E. M., vii., pp. 449, 483, pl. 17, fig. 17, ♂.

S. modestalis, Ld., ib., pl. 18, fig. 1, ♀.

A single ♂ from Lages, mouth of R. Negro, Aug. 4th, 1874.

117. *Voliba major*, n. s.

Fore wing pale ochreous, rather glossy, with three dark lines, two simply curved; one close to the base, the second a little beyond; the third post-median forms first a bracket-shaped mark thus } nearly reaching the anal angle, then a double curve basewards, the upper convexity touching the lower end of the reniform stigma, and finally another angle like the first before it reaches the inner margin about the middle. Reniform stigma outlined with brown; marginal line brown. Hind wing with the reniform stigma and curved external line reproduced. Head, thorax, and abdomen ochreous. Expanse of wings, 18 mm.

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One ♂. Ilha Cuxinara, R. Solimoes, Oct. 13th, 1874.

Evidently closely allied to *Voliba scoparialis*, Wlk., Cat. Lep. Het. B. M., xxxv., 1983 = *Gabrisa scoparialis*, Wlk., ib., xxxiv., 1266. Walker himself altered the generic name, having already used *Gabrisa* for another genus. His type of *G. scoparialis* is from Sydney.

HYDROCAMPIDÆ.

118. *Aulacodes æschmialis.*

Aulacodes æschmialis, Gn., Delt. & Pyr., 258, 243.

One ♀ from Urucuri, R. Purus, Oct. 2nd, 1874; two females and one male from R. Jutahi, Feb. 5th, 1875.

Guenée's types were from Cayenne.

119. *Hydrocampa tortalis.*

Hydrocampa tortalis, Ld., W. E. M., vii., pp. 432, 484, pl. 18, fig. 3.

One ♂, from R. Javary, Dec. 3rd, 1874.

One of the smallest species of the genus.

120. *Paraponyx distinctalis.*

Paraponyx distinctalis, Snellen, Tijd. v. Ent., 1875, p. 261, pl. 14, fig. 14.

One ♀, from Manaos, June 13th, 1874.

Marking for marking the species is like (*Oligostigma*) *Paraponyx pallida*, Butler, from Rockhampton, but is only half the size.

121. *Paraponyx flavimarginalis*, n. s.

Fore wings fuscous, paler along the costa, with a narrow, indistinct, pale discal streak, elbowed near the anal angle, and thence whiter to the middle of the inner margin; followed by a fuscous fascia, which becomes narrowed towards the anal angle, and is there suffused with yellow; a yellow marginal streak, continued beyond the anal angle, finely edged internally with fuscous, and preceded by a narrower white streak. Fringes with two narrow dark parallel lines. Hind wings broadly dark fuscous at the base, with a broad white central transverse fascia, followed by a fuscous fascia shot with yellow, and altogether yellow at each end, separated by a narrow white band from the yellow marginal fascia; fringes with two fine dark parallel marginal lines, forming below the apical angle, the inner one three arrow-headed marks, the

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outer three black spots. Under side pale, all the markings showing through. Head and thorax fuscous; abdomen and legs pale ochreous. Expanse of wings, 22 mm.

One ♀, from Barreira bianca, R. Jutahi, Feb. 3rd, 1875.

122. *Cataclysta trilinealis*, n. s.

Fore wings with a pale ground, which is almost entirely suffused with brown atoms and fulvous shading, by which all the usual markings are more or less lost. We can discern a central dark fascia through both wings; a yellow streak along the hind margin preceded by a *leaden* streak, and that again by another tawny one; a tawny spot at the anal angle. In the hind wings, before the marginal row of steel spots, are three curved parallel black lines, and the centre of the wing is sprinkled with lustrous scales. Expanse of wings, 16 mm.

Six females. One from Prainha, Nov. 14th, 1873; one from Aveyros, March 11th, 1874; two from Faro, April 10th, one from Sapucaia Croca, R. Madeira, May 15th, one from Lages, mouth of R. Negro, Aug. 4th, 1874.

123. *Cataclysta divisalis.*

Cataclysta divisalis, Wlk., Cat. Lep. Het. B. M., xxxiv., p. 1336.

Three specimens, all females. Two from Aveyros, June 11th, 1874, and March 11th, 1875; the third from Prainha, Nov. 14th, 1873.

The single example from which Walker describes the species came from Para, from Mr. Bates's collection.

124. *Cataclysta callistoalis.*

Cataclysta callistoalis, Wlk., Cat. Lep. Het. B. M., xvii., p. 442.

One ♂, from R. Jurua, Nov. 7th, 1874.

CHOREUTIDÆ.

125. *Simæthis amatana.*

Simæthis amatana, Wlk., Cat. Lep. Het. B. M., xxviii., p. 451.

One ♂. Ilha das Araras, R. Madeira, June 4th, 1874.

The North American genus *Brenthia*, Clemens, should certainly be placed among the *Choreutidæ*.

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IX. *Notes on* Aulacophora *and allied genera.* By Joseph S. Baly, M.R.C.S., F.L.S., &c.

[Read February 6th, 1889.]

A paper of mine appeared in the Linnean 'Journal,' vol. xx., p. 1 (1886), in which I diagnosed those then known to me of the Indian and African species of *Aulacophora*, drawing up the characters, as far as possible, on the structural differences of the anal segment of the abdomen, thorax, and other parts; in the autumn of last year (1888) a second paper was published in the same Journal, vol. xx., p. 156, which contains the descriptions of other species, which in the interim I had been able to study. In the third part of the French 'Annales,' December, 1888, a Synopsis of this group, together with *Diacantha* and *Hyperacantha*, has been published by M. Allard. This paper bears marks of hasty compilation and of insufficient study of the various specific forms; numerous errors have consequently crept in.

Having for several years made a special study of the group, I shall in the present communication endeavour to point out these errors, feeling sure that if allowed to remain they will add greatly to the difficulties of future students.

M. Allard has drawn his diagnoses almost exclusively from colour alone, ignoring the characters (so valuable in the present group) derived from structural differences in the anal segment of the abdomen.

Paridea, a genus characterised by myself (Journ. Linn. Soc., xx., p. 26), is not noticed in the Synopsis; it differs from *Hyperacantha*, Chapuis, in having all the tibiæ armed with a short spine.

In my two papers on *Aulacophora* I endeavoured as far as possible to retain the names of the older authors, only rejecting those which, from the short and imperfect diagnosis, and from the destruction or

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inaccessibility of the type-specimens, could not be recognised.

The numbers attached to the species in the present paper correspond with those used in the Synopsis; the names in italics are those given by M. Allard as synonyms of the insects under which they stand.

Genus Aulacophora.

Sp. 1. *coffeæ*, Horns.

M. Allard appears to have drawn his short description of the above species from the dark form of *A. similis*, Oliv., ♂.

Sp. 2. *pubescens*, Allard.

Judging from the short description, and from the pubescence on the elytra, this insect probably belongs to another genus.

Sp. 3. *abdominalis*, Fabr.

M. Allard has evidently made his diagnosis on *argyrogaster*, Perroud, a New Caledonian form. Perroud's insect differs from *abdominalis* in its larger size and black legs; *excisa*, mihi, of which I only know the ♀, has an emarginate apex to the pygidium, in the two other species the pygidium is entire.

Sp. 5. *delata*, Erichs.

foveicollis, Kuster.

Overlooking the peculiar sculpture of the head in Erichson's species, Allard has placed together the above distinct forms; *delata* is a Tropical African insect; *foveicollis*, formerly confounded with *abdominalis*, Fab., has the front simple in both sexes, and is spread over Asia, Southern Europe, and Northern Africa. It is more than probable that M. Allard has not had the true *delata* under examination; Erichson, in his very clear description, makes no mention of any pubescence on the upper surface of the body; the thoracic sulcation is also straight, not curved, as described by the author of the Synopsis; the coloration of the under surface in *delata* varies from black to entirely flavous.

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Sp. 7. *similis*, Oliv.

flavipes, Jac.

M. Olivier, in his description, gives the labrum as sometimes black, and has apparently mixed up the present species with *coffeæ*, Horns, in which latter the labrum is always black; in *similis*, on the other hand, it is constantly flavous. He also describes the sulcation of the thorax as straight; this is the case, or nearly so, in the ♀ of *similis*, but in the ♂ its middle third is curved backwards and more deeply impressed; in *coffeæ* the groove is nearly straight and of equal depth in both sexes. The scutellum in this species varies from black or nigro-piceous to flavous.

Sp. 8. *detrita*, Fabr.?

The true *detrita*, Fabr., belongs to the genus *Malacosoma*.

Sp. 9. *cornuta*, Baly.

In the short description given in the Synopsis, mention is made of a long protuberance on the labrum, no notice being taken of the horns on the clypeus, present in the ♂ of my species; M. Allard must therefore have had another insect under examination.

Sp. 10. *plicaticollis*, Allard.

This insect is probably a variety of *similis*, Oliv.

Sp. 12. *dilatata*, Jac.

One of the numerous varieties of *luteicornis*, Fabr.

Sp. 13. *unicolor*, Jac.

flavescens, Chap.

Chapuisi, Duv.

Chapuisi, Duv. (*flavescens*, Chap.), is less than half the size of *unicolor*, and is a quite distinct specific form.

Sp. 22. *bicolor*, Weber.

sexnotata, Chapuis.

M. Allard has drawn up his specific characters from a pale variety of this species, not mentioning either the typical coloration, as described by Weber, or the spotted

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variety (*A. sexnotata*, Chap.), although he has placed this latter name as a synonym of the species. In my diagnosis of *bicolor*, *l. c.*, p. 19, I described the ground colour of the elytra as black, whereas it ought to have been nigro-cæruleous. In *A. semiopaca*, Jac., which does not differ except in colour from the parent form, the cæruleous tint is absent.

Sp. 23. *relicta*, Boisd.

Duvivieri, Baly.

In Boisduval's description the legs are given as flavous, the hinder pair alone being stained with fuscous; in *Duvivieri* the four hinder legs are black. Not knowing Boisduval's type I am unable to give any structural differences, but *relicta* is an Australian insect, whilst *Duvivieri* is a native of Java and Malacca.

Sp. 25. *scutellata*, Boisd.

palustris, Perroud.

Wallacei, Baly.

Boisduval's description, "*Lutea; scutello nigro; abdomine pectoreque nigro-fuscis*," is too brief and vague in the absence of the actual type (now probably destroyed) to be applied to any one given species of the genus: *palustris*, Perroud, a common New Caledonian insect, belongs (as I have ascertained both from M. Perroud's full description and from the examination of authentic specimens) to the genus *Monolepta*: *Wallacei*, mihi, has the four hinder legs black. In the absence of Boisduval's type it is impossible to give any structural differences.

Sp. 27. *nigroscutata*, Baly.

Var. *Mouhoti*, Baly.

These two species, which M. Allard has placed together as varieties of one specific form, are perfectly distinct; in *nigroscutata*, a ♀, the apex of the anal segment of the abdomen is produced into a long acute process; in the same sex of *Mouhoti* the apex is deeply trilobate.

Sp. 28. *bicornuta*, Allard.

This insect is only a dark variety of *cornuta*, mihi.

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Sp. 32. *marginicollis*, Allard.

A black variety of *luteicornis*, Fabr., in which the antennæ and sides of the thorax are flavous.

Sp. 37. *ioptera*, Wied.

Boisduvali, Baly.

It is difficult to understand on what grounds M. Allard united my species with that of Wiedeman; that author describes the elytra as subnitidous and deep violaceous; in *Boisduvali* they are shining black. I omitted to mention in my description of this insect that the apex of the pygidium is distinctly emarginate in both sexes; the apex of the anal segment is also faintly sinuate in the ♀.

Sp. 32. *nigrivestis*, Boisd.

♀ *Lewisii*, Baly.

In my first paper on *Aulacophora* I suggested that *Lewisii* might possibly be the ♀ of *nigrivestis;* since then I have received both sexes of my species, and have characterised the ♂ in my second paper, p. 179.

Sp. 40. *cyanoptera*, Boisd.

antennata, Baly.

I did not adopt Boisduval's name for my species for the following reasons: in the first place, the author's diagnosis, "*D'un rouge jaune, avec les élytres d'un noir profond et luisant; pattes noires,*" would apply equally well to half-a-dozen other species of the genus; secondly, no mention is made of the dilated apical joint of the antennæ in the ♂; lastly, the name *cyanoptera* is misleading, the colour of the elytra in my insect, and also (from the description) in that of Boisduval's, being jet-black.

Sp. 45. *luteicornis*, Fabr.

simplicipennis, Clark.

? *apicalis*, Jac. ?

A. simplicipennis is a pale variety of *luteicornis; apicalis*, Jac., has jet-black antennæ and appendiculated claws; it must be placed in *Paridea*.*

* This genus, although characterised in the former of my papers on *Aulacophora*, *l. c.*, xx., p. 27, is not noticed in Allard's Synopsis.

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Sp. 51. *circumdata*, Blanch.

Stevensi, Baly.

Blanchard, in his description of *circumdata*, gives the elytra as rufo-flavous, with a sublateral line and the apex black, omitting all mention of the black suture, present in all the specimens that I have seen of *Stevensi*. In the latter the ground colour of the elytra, as well as that of the whole body, is pale flavous. Not knowing Blanchard's species I am unable to point out any structural differences, but am decidedly of opinion that the two insects should be left apart. Allard, who has apparently drawn up his diagnosis of *circumdata* from a specimen of *Stevensi*, gives Sierra Leone as its habitat. Boisduval's species is a native of New Guinea; *Stevensi* is found in India and Ceylon.

Sp. 57. *robusta*, Duviv.

A dark form of *cornuta*.

Sp. 62. *dorsalis*, Boisd.

propinqua, Baly.

In my description of *propinqua* I pointed out my reasons for separating it from *dorsalis*, Boisd., with which insect it is placed by Allard. I may add that in *propinqua* the yellow band on the elytra is much more regular, scarcely or not at all dilated on the suture, and extending nearly (in some specimens quite) to the lateral margin. The two species, although closely allied, are without doubt distinct. Mr. Wallace met with both insects in the Malay Archipelago.

Sp. 63. *unifasciata*, Oliv.

Having appendiculated claws, this species must be placed in the genus *Hyperacantha*. The ♂ (*quadrifasciata*, Allard) differs from the other sex in having, on each elytron towards its apex, a second flavous patch, on the middle of which is placed a large acute tubercle.

Sp. 67. *Cartereti*, Guér.

instabilis, Baly.

The above species are united under one head in the Synopsis. In *Cartereti* the medial lobe of the anal

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segment in the ♂ is much more deeply excavated, whilst the apex of the same segment in the ♀ is broader and more obtuse; the arrangement of the flavous coloration of the elytra differs also in the two species; in *Cartereti* it forms a broad transverse band, which occupies, or nearly occupies, the middle third of the elytron; in *instabilis*, on the other hand, this band is interrupted, and in some specimens entirely obsolete on the sides. I possess a ♂ specimen of *Cartereti* from Port Moresby, in which a small fulvous spot is placed at the apex of each elytron; a ♀ from the same locality has the legs and under surface of the body pale piceous.

Sp. 70. *hilaris*, Boisd.

nigrosignata, Baly.
? Var. *insularis*, Jacoby ?.
? *pectoralis*, Jacoby.

The description of Boisduval (whose type is now, I believe, lost), "*Lutea, utrinque nigro bicincta,*" is too brief to be assigned with the slightest degree of certainty to any of the above species. I will therefore only add that whilst *hilaris* and *pectoralis* are Australian forms, *nigrosignata* and *insularis* are natives of the Malay Archipelago; the name *pectoralis* has, however, already been used by Chapuis for a Philippine Island species, and must be changed. I therefore propose to alter it to *Borréi*.

Sp. 73. *analis*, Weber.

The Australian species described and figured by Olivier, and usually standing in collections under this name, is an entirely distinct specific form, which I have described in my second paper, *l. c.*, p. 184, under the name of *Olivieri*. I have also, *l. c.*, p. 176, recharacterised the true *analis*, pointing out the structural and other characters which separate the two species: *analis*, Weber, is a native of Sumatra and the other islands of the Malay Archipelago, whilst *Olivieri* is found in various parts of Australia.

The type and varieties of *A. varians*, Chapuis, belong, I believe, to the present species.

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Sp. 76. *affinis*, Montrouz.

Deplanchei, Perroud.

approximata, Baly.

The words used in the Synopsis, "*Poitrine et abdomen d'un noir de poix*," are not used by Montrouzier, who says, "*Tête et corselet rouges,—bouche, antennes et yeux noires,—elytres lisses, rouges avec deux boudes noires, une à la base l'autre à l'extremité, jambes rembrunies.*" The two species joined with *affinis* by Allard differ (judging from the above description) from his insect in having the hinder band on the elytron replaced by a large subrotundate patch; in *Deplanchei* the tibiæ, breast, and abdomen are black; *approximata* is paler and much larger in size. *A. approximata* is found in New Guinea; the two others are natives of New Caledonia.

Sp. 89. *perplexa*, Baly.

A recent examination of this insect has shown me that its claws are not bifid, but appendiculated; it must therefore be placed in my genus *Paridea*.

Sp. 96. *bidentata*, Fabr.

impressa, Fabr.

The error into which Allard has fallen in uniting these two species, one an African, the other an Indian form, may be explained by the fact that Fabricius, having already described several species of *Halticinæ* and *Galerucinæ* under the common name of *impressa*, subsequently (in Ill. Mag., ii., p. 298) altered one of them, the present insect, into *bidentata;* this change was adopted by Schönherr and some of the older writers, but subsequent authors, finding that the insects belonged to different genera, restored the original name; it thus stands in Harold's catalogue, *bidentata* being placed as a synonym, and the same locality, Tranquebar, being placed against each. Fabricius had, however already (Spec. Ins., p. 151) described a species of *Galerucinæ* from Tropical Africa as *Crioceres bidentata;* this is the insect from which Allard has evidently drawn his diagnosis, and confounded with the true *impressa*. It is placed in Harold's catalogue in the genus *Diacantha;* but Mr. C. O. Waterhouse, who has kindly examined the type-

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specimen in the Baukeian collection now in the British Museum, informs me that the claws are appendiculated; it must therefore be removed to *Hyperacantha*, Chapuis.

Sp. 101. *serena*, Boh.

This species is not an *Aulacophora*, but must be placed in *Mimastea*, or some nearly-allied genus.

The following species, placed in *Aulacophora* by M. Allard, have appendiculated claws, and the anterior pair of tibiæ unarmed; they must therefore be removed to the genus *Hyperacantha*:—

Sp. 36. *melanoptera*, Thoms.
,, 41. *rubrocastanea*, Allard.
,, 63. *unifasciata*, Oliv.
,, 78. *granulata*, Allard.
,, 79. *oculata*, Karsch.*
,, 92. *Deusserii*, Karsch.
,, 96. *bidentata*, Fabr.
,, 95. *insignipennis*, Thoms.
,, 96. *quadrifasciata*, Allard.†
,, 98. *flavo-niger*, Thoms.

The four species below are here characterised for the first time:—

Aulacophora armigera.

Anguste ovata, postice paullo ampliata, flava, nitida, pectore abdomineque, ano piceo excepto, nigris; pedibus posticis piceis, intermediis piceo-fulvis; antennis, basi exceptis, fuscis; thorace sat fortiter transversim sulcato; elytris tenuissime punctatis.

Fem.—Pygidii apice dente acuto armato; abdominis segmento anali late truncato. Long. 3 lin.

Hab. Murray Island, North Australia; a single specimen.

Labrum and eyes black. Three lower joints of antennæ flavous, the following piceo-fuscous, the rest broken off. Thorax nearly

* The female of this species has two additional black spots on the thorax, one on either side; there are also two others on the vertex; these markings are constant in all the female specimens that I have seen.

† This species is evidently the male of *unifasciata*, Oliv., described by Fairmaire in the French 'Annales' for 1866, p. 252.

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twice as broad as long; sides nearly straight and slightly diverging from the base to beyond the middle, thence obliquely converging and slightly rounded towards the apex; upper surface distinctly punctured on either side in front; discoidal groove deeply impressed, obsoletely sinuate on its middle third. Elytra narrowly oblong, dilated posteriorly, convex, not depressed below the basilar space, very minutely punctured.

The tooth at the apex of the pygidium will separate this species from its allies.

Aulacophora apicicornis.

Ovata, postice ampliata, convexa, rufa, subtus rufo-fulva, nitida, antennis flavis; thorace profunde transversim sulcato; pedibus elytrisque nigris, his infra basin transversim depressis, tenuiter punctatis.

Mas.—Antennarum articulo ultimo ampliato, ovali, apice acuto, integro abdominis segmento anali trilobato, lobo intermedio concavo.

Fœm. — Abdominis segmento anali apice trisinuato. Long. 3¾—4 lin.

Hab. Sumatra.

Labrum concolorous with the upper face; antennæ filiform, four-fifths the length of the body in the ♀, rather shorter in the ♂, the apical joint in this latter sex compressed and dilated, ovate, its apex acute; the basal joint piceo-fulvous, the extreme apex of the terminal joint nigro-piceous. Thorax twice as broad as long; sides straight and parallel from the base to beyond the middle, thence obliquely converging towards the apex, the anterior angles slightly thickened; disk deeply impressed immediately behind the middle with a nearly straight transverse sulcation; surface shining, finely punctured on either side in front. Elytra broadly ovate, convex, distinctly depressed transversely below the basilar space, minutely punctured.

The entire apical joint of the antennæ in the ♂ will separate this species from the same sex of *antennata;* the trilobate apical segment of the abdomen in the other sex distinguishes it from its congeners with black elytra.

Aulacophora diversa.

Ovata, postice ampliata, convexa, rufo-fulva, nitida, antennis flavis; labro, elytris, tibiis tarsisque nigris; thorace sat profunde transversim sulcato; elytris infra basin transversim impressis, tenuiter punctatis.

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Mas.—Antennarum articulis 2do, 3tio, 4to, 5toque compressis, paullo dilatatis et extus carinatis; abdominis segmento anali trilobato, lobo intermedio subquadrato, plano.

Fœm.—Abdominis segmento anali bilobato, lobis planis. Long. 3½—4 lin.

Hab. Borneo.

Antennæ two-thirds the length of the body, pale flavous, the extreme apex of the terminal joint nigro-piceous; the second, third, fourth, fifth, and sixth joints in the ♂ compressed and very slightly dilated, the second trigonate, the third twice its length, its outer margin carinate, distinctly sinuate, the fourth, fifth, and sixth also carinate, each rather shorter than the third. Thorax twice as broad as long; sides nearly straight and parallel, emarginate just behind the anterior angles, the latter subacute; the hinder angles obtuse; upper surface impressed just behind the middle with a deep, nearly straight, transverse groove; surface distinctly punctured, the punctures coarse and more crowded on either side in front. Elytra oblong-ovate, dilated posteriorly; convex, transversely depressed below the basilar space, distinctly and rather closely punctured.

The dilated antennæ in the ♂, together with the bilobed apical segment of the abdomen in the ♀, will separate this species from its congeners with similarly coloured elytra.

Aulacophora biplagiata.

Late ovata, postice ampliata, convexa, rufo-testacea, nitida, antennis flavis, apice nigro-piceis; tibiis, tarsis elytrorumque plagis sub-humeralibus duabus, nigris.

Mas. — Abdominis segmento anali trilobato, lobo intermedio plano, sulco longitudinali leviter impresso.

Fœm.—Abdominis segmento anali integro, apice extremo obtuse truncato. Long. 4—4½ lin.

Hab. Solo-Sula.

Antennæ nearly four-fifths the length of the body, filiform in both sexes, flavous, the basal joint rufo-fulvous, the apex of the terminal one nigro-piceous, the second and two or three following joints sometimes stained with piceous. Thorax twice as broad as long; sides rounded anteriorly, obsoletely sinuate and slightly diverging behind the middle; upper surface impressed just behind the middle with a deep transverse groove. Elytra broadly oblong-ovate, convex, deeply excavated transversely below the basilar

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space, the latter slightly thickened, the surface between it and the humeral callus rather deeply excavated; disk minutely punctured; each elytron below the shoulder with a large black patch, attached to the lateral margin, but terminating on the inner disk at some distance from the suture.

Genus Hyperacantha, *Chapuis*.

It will be seen that I have removed some insects, placed in M. Allard's paper under *Aulacophora*, into the present genus. In some of the species that I have examined, as well as in some of those belonging to *Diacantha*, the elytral epipleura is not abbreviated before reaching the middle, but is continued downwards nearly to the apex as a narrow grooved line, usually impressed with a single row of punctures.

Genus Pseudocophora, *Jacoby*.

Four new species are characterised by M. Allard in his paper. Unfortunately the descriptions are so short that they are practically useless, and will, I fear, be found rather a hindrance than a help to any student of the genus. The author has also omitted all notice of *P. brunnea*, mihi, although that species was published in my first paper on *Aulacophora*, p. 26. In the autumn of last year (Journ. Linn. Soc., xx., p. 168) I gave a synopsis of all the species known to me; of these (ten in number) six were described as new. It is more than probable, from the short time that elapsed from the publication of my paper to the appearance of that of M. Allard's, it had not come under his notice.

Genus Hoplosoma, *Jacoby*.

M. Allard, in giving his list of the species, has omitted two species, *ventralis* and *ornata*, described by myself in Trans. Ent. Soc. Lond., March, 1886, p. 27: he has also passed over one of Mr. Jacoby's, *celebensis*, characterised in the 'Annals of the Genoa Museum' for October, 1886, p. 81: *ventralis*, mihi, is, I believe, identical with both *celebensis*, Jac., and *corniculata*, Allard, and, having been the earliest described, must stand as the name of the species.

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Genus Malaxia, *Fairm.*

Glyptolus, Jacoby.

In a short paper of mine in the Ent. Month. Mag. for 1887, vol. 23, p. 268, I pointed out that these two names had been applied by their respective authors to two different species belonging to the same generic form. In this paper I also stated that Mr. Jacoby was correct describing the claws as appendiculated. One of M. Allard's species, *Alluardi*, has, I believe, already been described by Falderman under the name of *Auchema? thalapina*. *Apophylia nobilitata*, Gerst., and *chloroptera*, Thoms., African forms, both must be placed in the present genus.

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X. *Descriptions and life-histories of new species of* Rhopalocera *from the Western Pacific.* By GERVASE F. MATHEW, Staff-Paymaster, R.N., F.L.S., F.Z.S., &c.

[Read March 6th, 1889.]

Melanitis ponapensis, n. s.

Male and female: Upper side dull sepia-brown; *primaries* slightly paler on the costa, and with a darker blotch towards the end of cell and at apex; a black ocellus inwardly bordered with fuscous, and with a small white pupil between second discoidal and second median nervules near the apex; above this, between first and second discoidal nervules, a linear black dash outwardly enclosing an oval white spot much larger than the pupil of ocellus; *secondaries*, a small ocellus at anal angle between first and second median nervules, and sometimes a very minute ocellus between second and third median nervules. *Under side* umber-brown, inclining to fuscous, and more or less mottled or irrorated with darker lines; *fore wings*, a broad transverse reddish-brown fascia from beyond middle nearly to inner margin; apical region somewhat paler; four ocelli, the fourth between second discoidal and second median nervules the largest, the others, two of which are near the apex, very small; *secondaries*, basal half the darkest and outwardly bordered by a reddish-brown fascia from middle of costa to inner margin; five ocelli, those between first and second subcostal nervules and first and second median nervules the largest, the one at anal angle the smallest. The under sides vary considerably. Exp. 54 mm.

Hab. Port Metalanim, Ponapè, Caroline Islands.

Obs. This, although probably only a small local race of *M. leda*, appears to differ so much in various particulars as to entitle it to a specific name.

Lampides phaseli, n. s.

Male: Upper side dull violet-blue suffused with brown, with rather broad brown hind marginal borders; *secondaries*, some indistinct blackish lunules in marginal border. *Under side* light brown;

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primaries, two white lines at end of cell, beyond which are two waved transverse white lines, followed by a row of indistinct submarginal lunules; *secondaries* crossed by a series of waved white lines, and a series of submarginal brownish lunules encircled with white; a small orange dot at anal angle, preceded by a large black spot inwardly margined with orange.

Female: Upper side brown; *primaries*, a pale blue triangular blotch at basal lower half entering cell, extending to inner margin, and subdivided by nervures; *secondaries*, a narrow dark brown hind marginal line, preceded by a submarginal row of indistinct lunules inwardly bordered by blue; *under side* same as male, but paler. Exp. 28 to 31 mm.

Hab. Claremont Islands, N.E. coast of Queensland.

These little butterflies were very numerous and very active, flying with great rapidity among the flowers of a leguminous plant, allied to our common garden scarlet-runner, which was climbing in masses over bushes and on the rough ground, and in the flower-buds of which I discovered their larvæ.

The full-grown larva is onisciform, short and plump, and of a clear rosy brown colour; head very small, pale straw-yellow, and retractile within second segment; segmental divisions well-defined; a few scattered umber-brown blotches upon dorsal area of first four segments, and one or two upon the remaining segments; second segment blackish anteriorly, which makes the larva appear as if it was withdrawing its head into a black collar; indistinct dorsal and subdorsal stripes; ventral area with a central bluish green stripe.

Larva a quarter grown pale greenish, with indistinct dorsal and spiracular stripes, and clothed with fine pale-coloured hairs, especially upon the posterior segments.

Lycæna lulu, n. s.

Male: Upper side dull purplish blue; *primaries*, hind marginal border rather broad, dark brown, broader at apex; *secondaries*, costa and hind marginal border dark brown.

Female: Upper side ashy brown; *primaries*, a somewhat triangular-shaped blotch composed of bright metallic-blue atoms on disc, extending sometimes into lower part of cell and subdivided by the nervules; *secondaries* dusted with blue atoms at base and on inner margin. *Under side:* Both sexes ashy grey, a very narrow dark brown hind marginal line, and a submarginal series

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of indistinct pale lunules, the one preceding that at anal angle of secondaries sometimes having a black spot in its centre. Fringes pale grey. Exp. 22 to 24 mm.

This little butterfly was very common at Tongatabu, and it also occurred at Fiji, Samoa, and the New Hebrides; and I have a worn specimen from Cooktown, Queensland, which I believe is referable to the same species.

I obtained the first larvæ by beating. The butterflies were very local, and only to be found in the neighbourhood of certain papilionaceous shrubs. I afterwards discovered that the larvæ were easy to find by simply examining the clusters of flower-buds at the extremity of a branch, for wherever there was a larva, there were sure to be half-a-dozen or more red ants crawling over it, and thus betraying its position. Moreover, the larvæ took no pains to conceal themselves, but fed quite exposed among the buds. They were also accompanied by numbers of small black aphides.

The full-grown larva is from 12 to 14 mm. long, onisciform, not much thickened in the middle, but almost of uniform stoutness throughout, is slightly pubescent, and has a few short scattered bristles; head very small, retractile, pinkish brown, with a dark V-shaped mark on face and black ocelli; segmental divisions finely though clearly defined; the colour varies from pale pea-green to a warm pinkish green; a conspicuous purple dorsal stripe bordered on each segment by crescent-shaped purple marks, which are broadly margined below with whitish yellow, forming a pattern down the back; spiracular line pale yellowish pink, bordered above and below with purple; space between the dorsal and spiracular lines slashed with short obscure purple stripes; ventral area and claspers paler; whole surface more or less irrorated with minute black and white dots, scarcely visible to the naked eye; legs very small, pale pinkish green. Upon each side of the anterior part of the thirteenth segment, a little above the spiracular line, there is a small whitish tubercle, from which the larva can at pleasure emit a short fleshy tentacle, which is crowned at its summit by a fascicle, or whorl, of fine white bristles. The larvæ would not protrude this organ when they were breathed upon, touched, or otherwise annoyed, but only occasionally as

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they crawled along, or when they were feeding with their heads deeply buried in the flower-buds. While so engaged they shot them out frequently and rapidly. The fascicle of bristles was not expanded until the tentacle was extended to its entire length, and was closed again before it was withdrawn. This organ is possibly a protective weapon against ichneumons, but I do not remember having previously observed it in any other *Lycæna* larva.

The chrysalis is 8 mm. long, rather stumpy and obese, covered with a fine short pubescence, of a light pinkish buff colour tinged with green, and mottled all over with dots and small blotches of dark brown. It is attached to a leaf or among the flower-heads of its food-plant. At first it very much resembles the larva, so much so that one can hardly believe that any change has taken place. A short time before the butterfly emerges it becomes of a deep lead-colour. I bred about fifty butterflies.

Obs. This species is rather sluggish in its habits, so "lulu," which is the native word for an owl, seems rather an appropriate name for it.

Papilio megasthenes, n. s.

Female: Upper side deep olive-brown; *primaries*, base dusted with fine yellowish atoms; a marginal band of seven round pale yellow spots, their edges rather clouded; a large lunular-shaped spot at upper end of cell, and a square-shaped spot on costa towards apex, both bordered above by yellow; a somewhat oval-shaped spot outside lower upper end of cell, followed by a broad transverse band to inner margin, and across secondaries nearly to anal angle; all spots and band a beautiful bluish green; *secondaries*, band white on the costa; a marginal row of indistinct spots composed of yellowish atoms; inner margin and base thickly clothed with fine brownish hairs. *Under side: Primaries*, spots paler, the one towards apex greenish yellow; the three marginal spots at the apex almost obsolete, and in a patch of silvery pinkish atoms, the remaining four much larger than upon upper side, and in the form of lunules. *Secondaries*, the blue-green band bordered outwardly by an interrupted dark reddish-brown fascia, which terminates at the anal angle; beyond this some silvery grey to apex and upper third of hind margin; lower portion of hind margin dark reddish brown; inner margin clothed with fine light

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brown hairs; all the nervures near base of wings and legs green; palpi densely hairy. Exp. 61 mm.

Hab. Noumea, New Caledonia.

Obs. Near *P. gelon*, but the transverse band is much wider, and the spots are larger.

Papilio Tryoni, n. s.

Male: Upper side black; *primaries* with a marginal band of five creamy-white spots between the nervules, the one at the anal angle being much the largest, the others gradually decreasing in size towards the apex; *secondaries* not tailed, scalloped; a broad outwardly dentate pale greenish white band across the disc, its inner margin slightly impinging on lower part of cell, and its upper portion occupying the space between the costa and the subcostal nervure nearly to base; a marginal row of five creamy-yellow spots, the one at the anal angle the largest, the others small and clouded with black atoms. *Under side* black; *secondaries*, a marginal band of seven somewhat square-shaped spots between the nervures, the three nearest the apex the smallest; above these a row of ill-defined lunules composed of pale bluish atoms, those towards the apex being almost obsolete. Exp. 145 mm.

Hab. Ugi, Solomon Islands.

Obs. This fine species, which I have named after Admiral Sir George Tryon, K.C.B., lately Commander-in-Chief of the Australian Station, is closely allied to *Papilio Bridgei*, Math., from Treasury Island, but may at once be distinguished by its greater size and the disposition of the spots in the marginal bands.

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XI. *Notes on the genus* Erebia. By Henry J. Elwes, F.L.S., F.Z.S., &c.

[Read February 6th, 1889.]

With the object of making the butterflies of the palæarctic fauna better known to English entomologists, I have in recent years reviewed the genera *Colias* and *Parnassius*, and I now propose to make some remarks on the genus *Erebia*, which is, on account of its tendency to great variation and remarkable distribution, a most interesting and at the same time difficult genus.

Though our knowledge of many of the Arctic and Asiatic species is still too slight to make a monograph of the genus possible, yet so many additions have been made to the Erebias in the last ten or twelve years, by Russian collectors especially, that a large number of species are not included in Staudinger's Catalogue of 1870. Another reason for revising this genus is that a paper on it, by Herr von Gumppenberg, has appeared in the last number of the 'Stettiner Entomologische Zeitung,' which does not seem to be founded on a good knowledge of any but the European species; and as this arrangement of the genus is, in my opinion, not so natural as that of Staudinger, it should not be allowed to pass without criticism. At the same time I wish to show that some of the varieties which are defined by short Latin descriptions, both by Von Gumppenberg and Staudinger, cannot, in my opinion, be so defined as to include many specimens which occur.

It very frequently happens both in this and other genera that a number of variations exist which are not constant, and though it is sometimes possible to limit and define them in words, yet more often the attempt to make such a key to the genus as has been attempted by Von Gumppenberg, proves a failure when applied to a large number of specimens.

Though keys have been of late years very much in fashion among ornithologists, and are now being adopted

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by some systematic lepidopterists, yet I cannot say that I have found them satisfactory as a means of discriminating species of butterflies. It seems to me that, though they answer very well when applied to typical specimens, yet there are so many specimens in a large and well-selected collection which vary in some character or other, that even the short diagnoses which have been used for named varieties in Staudinger's Catalogue will not always apply; and, as far as my experience goes, we are reduced at last to rely upon a more or less indefinite opinion, based on examination of a large number of specimens, and upon our knowledge of the extent of variation found in other species of the genus. It is supposed by some that we may eventually arrive at a more accurate systematic arrangement, by a knowledge of the preparatory stages and the life-history of a species; or again, by an anatomical examination of the sexual organs, scales of the wings, or other parts. But though it is not so easy to observe variation in characters which require such minute examination as these, yet I do not doubt that variation exists; and though in the genus *Parnassius* I have found anatomical characters of the greatest assistance; in *Erebia* I have at present not been able to do so.

There is no doubt that the systematic arrangement of Staudinger's Catalogue, which I look upon as one of the most accurate and careful works ever produced, based as it is on his unrivalled knowledge of species, is incomparably better than the one adopted in the British Museum, where the idea seems to have been,—in the genus *Erebia* at least,—to find a specimen to match, or which is assumed to match, almost every name or description ever published, quite overlooking the fact that the authors of many of these names and descriptions were at the time very imperfectly acquainted with either the forms they were attempting to discriminate, or with their allies. And I think it is most detrimental to the value of such a Museum, which should be of use to all students who wish to have their own collections in good order, that the peculiar views which Mr. Butler holds in opposition to those of almost all other lepidopterists, should be developed to such a pernicious extent in the arrangement of this and many other genera.

It is true that when he published his Catalogue of

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Satyridæ in the British Museum, in 1868, that collection was so poor in European species that there was some excuse for the numerous incorrect or doubtful identifications and omissions which are found in it, though a very little care would have avoided the still more numerous incorrect localities given for many well-known species. But when a few years ago the rich and correctly-named collection of Zeller was acquired by the Museum, a good opportunity was afforded of correcting these mistakes, and of rearranging the genus in a manner which would make it of great service to the number of English entomologists who had previously no good collection of European Lepidoptera available for reference.

And, if Mr. Butler had not been satisfied with, or had disagreed with Zeller's ideas, which, however, were based on a much greater personal knowledge of this fauna than his own, it might have been expected that he would have taken some pains to study the latest opinions of the best authorities before rearranging the Collection. It appears, however, that so far from this, he has not even taken the trouble to write new labels, but has, as far as possible, endeavoured to make the new specimens fit in with the old names, and has in some cases separated the correctly-named specimens of Zeller, and placed them under several different so-called species; whilst in others he has united several perfectly well-known and distinct species under one head, distinguishing them as "local form" or "var.," without apparently the least idea as to what their local or general distribution is.

I am quite ready to admit the difficulty of correctly identifying many of the figures of Esper, Hübner, and others, and also of ascertaining with certainty the exact dates of publication of these plates, by which alone their priority can be determined. It really matters little or nothing now whether, for instance, *melas* of Herbst has two years' priority over *maurus* of Esper, as Staudinger thinks, or whether, as Butler believes, *maurus* has nineteen years' priority over *melas*. As, however, Esper distinctly states that his *maurus* came from Hungary, I fail to see why Butler should give its locality as "Pyrenees," or why he should mix up with it such perfectly distinct and well-known species as *nerine*, Frey., *stygne*, Ochs., *alecto*, Hübn. (so marked by Zeller, a variety of *glacialis*, Esp.), and *scipio*, Boisd.,

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excepting that they were so mixed up in the Catalogue and Collection in 1868.

When all these questions of priority and identification have been, it is hoped, for ever set at rest by the almost universal acceptance of the nomenclature of Staudinger's Catalogue, which, if not in all cases certainly correct, is a most praiseworthy and careful attempt to settle these difficult questions, I fail to see how Mr. Butler can expect his nomenclature of Erebias, which, on the other hand, has from the first been almost absolutely ignored, to be now accepted. And if he does not expect this, what can be the use of turning order into chaos, as he has done here?

As an additional proof of his peculiar ideas, I will give one instance only, that of *E. lappona*, Esp. This is a species about which there can be no question. It varies wherever it is found, but none of the varieties are known to be constant, or peculiar to one place, and therefore I think none are deserving of even varietal names. In the British Museum they are arranged as follows:—

E. manto, Denis.
E. castor, Esp.
E. castor, var.
E. lappona, Esp. (In the Catalogue this is treated as a synonym of *manto*.)
E. pollux, Esp.
E. mantoides, Butl. (Merely a Lapland specimen of *lappona*, which can be exactly matched in the Alps.)
E. sthennyo, Grasl. (Merely an inconstant var. from the Pyrenees.)

Thus making five species and two varieties out of one, whilst he had just before united five species into one. The result is that, so far as I have had occasion to consult it, the value of Zeller's Collection is for the time seriously impaired, and it would be better for Science that it should not have come to the British Museum in Mr. Butler's time, than that it should be the means of confusing and misleading those who might wish to obtain correct information on a subject which has hitherto been too little studied by British entomologists.

It will be unnecessary for me to go in detail through

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the Catalogue of Erebias in the British Museum, but I may say generally that it appears to illustrate a general desire to find specimens to fit names rather than to apply names to species; and in several instances where Staudinger and others have named varieties with more or less justice as varieties only, Butler has adopted the name as specific without indicating that the author of the name did not so consider it. This, of course, is a matter of opinion only, which is not of vital importance, but it is as well that a name given by an author should not be adopted in a different sense to that intended by him, or one may be led to suppose that such names as *sudetica*, Stgr., *pyrrhula*, Frey., *polaris*, Stgr., *uralensis*, Stgr., were used specifically by their authors, when it is really Mr. Butler who has so applied them.

In classifying the species of *Erebia* I am unable to follow Von Gumppenberg, who divides the genus into groups by the under side of the hind wing, especially in the female sex. The colour and banding of this wing is no doubt of much more value in determining the species than the colour or form of the bands or ocelli on the upper side, but it leads to the grouping of species which are otherwise but little related.

I think that the number of ocelli is of little account as a specific character, for in almost all species we find great variation in the number and size, but rarely in the position of the ocelli. The colour of the disk of the fore wing, especially on the under side, seems to be a more constant and useful character than any other, and often enables one to identify species when other characters vary.

There are no doubt some more or less natural groups within the genus, which I have tried to indicate by the sequence of the species; but none of them, I think, are as yet shown to be capable of such exact definition as would allow the formation of subgenera.

Butler has adopted as a separate genus *Oreina* of Westwood, including in it such little-allied species as *theano*, *melampus*, *glacialis*, and others, though I can see no reason for so doing. He also uses the generic name *Maniola*, Schrank. (which by Kirby is adopted for the whole of what I call *Erebia*), for some species which seem to have little affinity for each other, and, as far as I know, without indicating what he considers typical of

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Maniola. These are *epistygne*, Hüb., *afer*, Esp., from which he separates both *phegia* and *dalmata*, *parmenio*, and *ocnus*, whilst *kalmuka* at the end of the series is not assigned to any genus.

I am unable to find any exact limit between *Erebia* and the genus *Callerebia* of Butler, which appear to be connected by some of the Himalayan and Mongolian forms, yet the typical Callerebias are easily separable by their larger size, differently-shaped hind wings, and different style of marking on the under side.

My own collection, though not so complete as I could wish, includes specimens of all the known species, except *E. sofia*, Streck., *E. tundra*, Stgr., *E. dabanensis*, Ersch., *E. ero*, Men., *E. patagonica*, Mab.: all of which are only known from single or very few specimens in the collections of their describers. As I have had the advantage of examining the very fine series in the collections of Dr. Staudinger, M. Oberthür, and Messrs. Godman, Leech, and Strecker, I do not think I have overlooked any undescribed forms of importance. The distribution of the genus, as here accepted, is confined to the Palæarctic region, in which I must include all those parts of North America in which Erebias occur; and it is a curious fact that though they are present in almost every other part of the region except North Africa, there are none in the United States east of the Rocky Mountains.

There seem to be two principal centres of distribution. First and most important, the Alps of Central Europe, which have about 25 species, or if *eriphyle* and *euryale* are not considered good species, 23, of which 6, namely, *arete*, *pharte*, *mnestra*, *scipio*, *goante*, and *glacialis* are confined to this group of mountains, though *arete* is only found in their extreme eastern, and *scipio* in their extreme south-western district. In the Pyrenees we have 12 species, of which all are found in the Alps except *melas*; and there are two others, namely, *epistygne*, which is found in the lower mountains of Southern France, and *zapateri*, confined to Eastern Spain, which do not occur either in the Alps or Pyrenees.

In all, therefore, 27 species are found in Central and South-western Europe, only 2 of which extend to Great Britain, and 3 to Arctic Europe. Of the alpine species, 2 only extend to the higher mountains of Central Europe,

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namely, *melampus*, which occurs in Silesia, and *epiphron* in Silesia and the Hartz Mountains; whilst 3 others, namely, *medusa*, *æthiops*, and *ligea*, are found not only in the plains and lower hills of Central Germany, but extend far east into Siberia and Amurland, where they are the only European non-arctic species which occur.

In South-eastern Europe and the Balkan Peninsula we find no peculiar species except *afra* and *melas*, the former a lowland or steppe, the latter a high-mountain insect; both of them extend into Western Asia.

In the Caucasus we have no peculiar species at all, and none of the Siberian or Turkestan species occur. This is very remarkable when we consider the great elevation, extent, and isolation of the Caucasian Mountains, which would seem to be admirably adapted to the habits of the genus. Either there is some geological or other condition which has prevented the development of high alpine species in the Caucasus, or else the higher parts of the range have been greatly neglected by entomologists, for in the Grand Duke Romanoff's Catalogue of the Butterflies of the Caucasus I find an almost total absence of alpine butterflies peculiar to the range, *Parnassius nordmanni* and *Satyrus alpina* being perhaps the only exceptions; whilst the high mountain species of Central Europe are only represented by three or four, namely, *Pieris callidice*, *Argynnis pales*, *Erebia tyndarus*, and a form of *Lycæna orbitulus*. As none of the alpine forms found in Turkestan or the Himalayas extend so far west, we have what seems to be a unique instance of a great chain of high mountains almost devoid of true alpine Lepidoptera. I see no means of accounting for this but the extreme isolation of the range, which is bounded on the east and west by sea, and on the north by a steppe of more or less desert character and immense extent.

In the whole of Europe, therefore, including arctic species, we have 29 species of *Erebia*,—about half the genus,—of which only about 6, namely, *medusa*, ? *melampus*, *tyndarus*, *lappona*, *æthiops*, and *ligea*, extend to Siberia, and one, *E. afra*, to Turkestan.

In Turkestan and the Altai regions, but with two or three exceptions confined to the mountain ranges, we have another quite distinct group of species, about 14 in number, of which only *tyndarus* is found in Europe, and none apparently in Eastern Siberia, the remainder being, as far as we know, peculiar to the region.

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In Amurland and Northern Siberia we have 10 or 12 species, of which 3 or 4 are of arctic character; *parmenio* extends to Central Siberia, *cyclopius* west to the Ural, and one is found in Japan. None except *tristis*, *dabanensis*, *ero*, and *edda* are peculiar.

In Arctic America we have 4, or perhaps 5, of which *sofia* and *fasciata* are peculiar; and *discoidalis* extends to Eastern and Northern Asia.

Lastly, in the Rocky Mountains we have 4, of which *magdalena* and *epipsodea* are peculiar; while *tyndarus* extends to Europe and Asia; and *Disa*, as yet found only in the north, is a circumpolar species.

Synopsis of the Genus Erebia.*

1. Epiphron, *Knoch.*, Beit., iii., 131, t. 6 (1783); H.-S., 92–4.	*Hartz; Siles.; Blk. Forest; Vosges.*
var. *pyrenaica*, H.-S., 535—8 (inconstans, nomen vix conservandum, transitus ad *cassiopem* in partem.	*Pyr. or.*
var. *cassiope*, Fab., Mant., 42 (1787); Meyer-Dür, ii., figs. 4, 5, 7, (inconstans, formæ intermediæ adsunt).	*Alps; Pyr.; Hung. mont.; Scot.*
ab. *nelamus*, Boisd., Gen., p. 26 (1840); Meyer-Dür, ii., fig. 3, (ab. vix fasciata et fere inocellata).	
? var. *keferstein*i, Ev., Bull. Mosc., 1851, ii, 610; H.-S., 617—18 (forma dubia mihi natura ignota).	*Sib. cent. mont.*
2. Tundra, *Stgr.*, Rom. Mem., iii., p. 148, t. viii., 1 (1888).	*Irkutsk.*
3. Melampus, *Fuessl.*, Verz. Schw. Ins., p. 31, fig. 6 (1775); Esp., 103, 1.	*Alp.; Hung. alp.*
var. *sudetica*, Stgr. Cat., p. 10 (1861), (var. mac. ruf. majoribus, nomen vix conservandum).	*Silesia mont.; Alp.*
4. eriphyle, *Frey.*, ii., p. 150, t. 187, 3, 4 (1836); Meyer-Dür, p. 154, t. ii. 8; *cf.* Roth., Mitt. Schw. Ent. Ges., i., p. 110 (1863); Christ, *l.c.*, vi., p. 231 (1882): (sp. dubia an *melampus* var., an *melampus* et *pharte* hybrida.)	*Helv.; Styr.; Aust. inf.; Carn.; Car. mont. et alp.*

* In this Synopsis I have, to save space, in many cases used the same abbreviations as are used in Staudinger's 'Catalogue'; but I have omitted the greater part of the synonyms and references given by him as no longer necessary.

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5. ARETE, *Fab.*, Mant., 42 (1787); Hüb., 231—2.	*Car. alp.*
6. MNESTRA, *Hüb.*, 540—3 (1802); Esp., 120, 3, 4 (post 1802 ?).	*Alp.; Gal. alp.*
7. MAURISIUS, *Esp.*, 113, 4, 5; Forts., p. 106 (1802 ?). ? *pawlowskyi*, Men., Bull. Phys. Math., xvii., p. 217; En. iii., p. 145. ? var. *haberhaueri*, Stgr., S. E. Z., 1881, p. 268 (minus distincte notata, ? inconstans).	*Sib. cent.; Altai mont.* *Tarbagatai; Alatau mont.*
8. KINDERMANNI, *Stgr.*, S. E. Z., 1881, p. 269 (? bona sp. an *maurisii* var.).	*Altai mont.*
9. SOFIA, *Streck.*, Bull. Brook. Ent. Soc., 1881, p. 35 (mihi natura ignota, *maurisio* proxima *fide* Strecker).	*Fort Churchill Hudson Bay.*
10. THEANO, *Tausch.*, Mem. Mosc., i., p. 207, t. 13, 1 (1809). *stubbendorfi*, Men., Bull. Acad. Petr., v., p. 262 (1847).	*Sib. cent.; Altai; ? Amur sup.*
11. TURANICA, *Ersch.*, Hor. Ent. Ross., vol. xii., 1876, p. 336; Alph., *l. c.*, p. 80 (in separata), t. xv., fig. 22. var. *læta*, Stgr., S. E. Z., 1881, p. 275 (punctis paucioribus; nomen vix conservandum).	*Alatau, Namagan, Thian-shan*, 3000—10,000 *ped. alt.*
12. PHARTE, *Hüb.*, 491—4 (1802 ?).	*Alp. Tyrol; Styr.*
13. MANTO,* *Esp.*, 70, 2, 3 (1781), ii., p. 106, 120, 1. *pyrrha*, Fab., Mant., 42 (1787); Hüb., 235—6.	*Alp.; Pyr.; Hung. alp.*

* The synonymy of *E. manto*, Esp., and *E. lappona*, Esp., are disputed points, and require some explanation, but I have followed Staudinger, whose views, I think, are correct. He says that Schiffermuller's names, having no means of identification by descriptions or figures, do not give priority. Therefore, as Esper's plate of *manto* (1781) is unmistakeable, it has priority over *pyrrha* of Fabricius, Mant., 42 (1787); whilst *pyrrha* of Fabricius, Syst. Ent. (1775), though older, is a different species. *Manto* being thus preoccupied in 1781, the name cannot be used for another species (No. 27 in my synopsis) by Fabricius and Hübner, and gives place to *lappona*, Esp., t. 108, 3 (1798 ?). Esper had previously named varieties of the same species *Castor* and *Pollux*, t. 67, 2, 3 (1781), but these names had also been pre-occupied for other butterflies by Fabricius in 1777.

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var. *vogesiaca*, Christ, Mitt. Schw. Ent. Ges., vi. (1882), p. 9 in separata (inconstans, nomen haud conservandum.)	*Vosges mont.*, 3500—4000 *ped.*
var. *cæcilia*, Hüb., 213—14; Text, p. 35; H.-S., 584—5, var. supra fere vel tota nigra infra vix vel infasciata; (trans. ad œme ?).	*Alp.; Pyr.*
var. *pyrrhula*, Frey, Lep. Schw., p. 37 (1880). (var. minor, alpestris; an bona species ?).	*Graubunden*, 7—8000 *ped.*
14. CETO, Hüb., 578—9 (1803).	*Alp.; Hung. alp.; Gal. alp.*
var. vel ab ? *phorcys*, Freyer, 193, 2, iii., p. 4 (nomen vix conservandum).	
15. ŒME, Hüb., 530—33 (1803); Esp., 120, 2 (post 1803).	*Alp.; Gal. mont.; Pyr.*
var. *spodia*, Stgr. Cat. 1871, p. 24, *psodea*, Freyer, 121, 3, ii., p. 44; H.-S., 165—7 (forma major, ocellis majoribus, transitus ad *hippomedusam*).	*Austr. et Styr. alp. et mont.*
16. MEDUSA, Fabr., Mant., p. 40 (1787); Hüb., t. 45, 103—4.	*Germ. cent. et mer.; Belg.; Gal. or.; Helv. ad* 4000 *ped.*
var. *hippomedusa* (Ochs., Meiss. N. Anz. Schw., n. 12, p. 15, *fide* Meyer-Dür) (var. alpestris inconstans, transitus ad *spodiam*.)	*Aust. Styr. et Helv. mont. et alp.* (8700—6000 *ped. fide Meyer-Dür*).
var. *psodea*, Hüb., 497—9; Text, p. 34. (var. inconstans ocellis pluribus majoribus).	*Hung. or.; Bulg.; Ross. mer.; Pont. Arm.* (*fide Stgr.*).
var. *polaris*, Stgr., Cat., p. 10 (1861). (minor obscurior subt. subfasciata).	*Lap.; Norv. bor.; Finmark.*
var. *uralensis*, Stgr., Cat., p. 10 (1861): (minus ocellata subt. fasciata, an *polaris* var. vel transitus ad sequentem.)	*Ural mer.; Orenburg; Kirg. steppe* (*Mus. Stgr.*) *Sib. c.* (*Krasnoyarsk*).
17. EPIPSODEA, *Butl.*, Cat. Sat. Brit. Mus., p. 80, t. 2, fig. 9 (1868).	*Colorado alp., ad* 9500 *ped.; Montana, Idaho*, 2—7000 *ped.; Brit. Columbia.*
rhodia, W. H. Edw., Trans. Am. Ent. Soc., iii., p. 273 (1871).	
? var. *brucei*, Elwes (minor, absque ocellis, fascia rufa fere obsoleta).	*Summit County Colorado*, 12,000 *ped.*
18. STYGNE, *Ochs.*, i., 1, 276 (1807); H.-S., 90, 91, ♀.	*Germ. mer. et Gal. mer. mont.; Pyr.; Daghestan* (*fide Romanoff*).
pirene, Hüb., 223, 4 (1800 ?).	

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19. NERINE, *Freyer*, 13, 3, 4 (July, 1831); Boisd., Ic., 31, 6, 7 (1832).	*Germ. mer. or. et Tyrol mont.*
reichlini, H.-S., Corr. Ins. Nr., i., p. 5; Speyer, S. E. Z., 1865, 243.	
var. *stelviana*, Curo., Bull. Ent. Ital., iii., p. 347 (1871): (inconstans, nomen haud conservandum?).	*Ital. bor. alp.* (*Stelvio*).
var. *morula*, Speyer, S. E. Z., 1865, p. 248 (minor obscurior subtus unicolor).	*Tyrol mer.; Alp.*
20. SCIPIO, *Boisd.*, Ic., 30, 1—6, i., p. 152 (1832).	*Gall. alp. mer. or.* (*Digne*).
21. EPISTYGNE, *Hüb.*, Verz., p. 62 (1816); Hüb., 855—8.	*Gall. mer. or.*
22. MELAS, *Herbst*, 210, 4—7, viii., p. 191 (1796).	*Hung. mer. mont.; Carn.; Græcia mer. mont.; Dalm.*
maurus, Esp., 107, 3, 4 (1798?).	
forma *pyrenæa*, Ober., Ent., viii., p. 22; God., ii., t. xvii., 1, 2, ♂.	*Pyr. or.*, 7—9000 *ped.*
forma *astur*, Ob., *l. c.*, p. 22, t. i., 12, ♀ (formæ vix vel haud distinguendæ, *melas* proximæ).	*Asturias mont.*, 6—8000 *ped.*
var. *lefebvrei* (? Boisd., Ind., p. 23, 1829); Dup., t. xxxv., 3, 4, ♂; ? H.-S., 88, 9 (forma major ocellata, transitus ad *hewitsoni*.)	*Pyr. cent.*, 6—8000 *ped.*
hewitsoni, Led., Wien. Mon., 1864, p. 167, t. 3, 6, 7; Stgr., Hor. Ent., 1870, p. 65 (? *lefebvrei* var., vel transitus ad *eviam*).	*Georgia; Suanetia; Persia bor. mont.*
23. EVIAS, God., Tabl. Méth., p. 21 (1822); Lef. Ann. S. Lin., Paris, 1826, 488 t. 10.	*Val. Ped. et Gal. alp.; Pyr.; Hisp. centr.*
bonellii, Hüb., 892—5 (1827).	
24. GLACIALIS, *Esp.*, 116, 2 (ante 1800?); H.-S., 173—4.	*Helv. et Tyr. alp.*
pluto, Esp., 121, 1.	
var. vel ab. *alecto*, Hüb., 528—9 (1802?), *persephone*, Esp., 121, 5, 6 (1805?).	
25. MAGDALENA, *Streck.*, Bull. Brook. Ent. Soc., iii., p. 35 (1880); Edw., Butt., N. Am., iii., pt. v.; Er., 1, 1—4 (1888).	*Colorado*, 12,000—14,000 *ped.*
26. META, *Stgr.*, S. E. Z., 1886, p. 237.	*Namagan mont.* (*Turkestan*).
gertha, Stgr., *l. c.* (var. inconstans?; fasc. magis distincta, nomen vix conservandum).	

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var. *alexandra*, Stgr., *l. c.*, 1887, p. 55.	*Alexander Mnts.*
issyka, Stgr., *l. c.*, nom. vix conservandum; (ocellis majoribus, al. ant. rufescens, transitus ad *mopsos*).	(*prov. Samarcand*); *Issykkul* (*Turkestan*).
var. *mopsos*, Stgr., S. E. Z., 1886, p. 239 (♀ al. ant. rufescentibus. ♂ et ♀ punctis indistinctis).	*Prov. Samarcand; Kuldja.*
27. LAPPONA, *Esp.*, 108, 3 (1798?).	*Alp.; Pyr.; Scand.*
manto, Fab., Ent. Syst., 231 1793 nom. præocc.); Hübn., t. 45, 107—8.)	*mont.; Lap.; Alt.; Balk.!*
mantoides, Butl., Cat. Sat., p. 87, t. 2, 6.	
ab. *pollux*, Esp., 67, 3 (nom. præocc.)	
var. *sthennyo*, Grasl., Ann. Soc. Ent. Fr., 1850, t. 10, 1—3 (inconstans, nomen vix conservandum; fasc. alarum supra et infra obsoletis vel indistinctis).	*Pyr. centr.*
28. OCNUS, *Ev.*, Bull. Mosc., 1843, iii., 538, t. 8, 5, *a*, *b*; H.-S., 291—2.	*Sib. mer. alp.; Alatau; Ural.*
29. SIBO, *Alph.*, Lep. Kuldja (ex Hor. Ent. Ross., 1881), p. 83, t. xv., 20 ♂, 21 ♀.	*Kuldja alp.; Thianshan; Transili mont.*
thianshanica, Stgr. MSS.	
tartarica, Ersch. MSS.	
30. DISCOIDALIS, *Kirby*, Faun. Bor. Am., iv., p. 298, t. iii., 2, 3; Graeser, Berl. Ent. Zeit., 1888, p. 96.	*Am. bor.* (*Hud. Bay*); *Brit. Col.* (*Lord*); *Asia bor.*, 70° *N.* (*Tryb.*); *Amur. sup.* (*Graeser*); *Ougan, N.E. Asia* (*Maack*).
31. DABANENSIS, *Ersch.*, Hor. Ent. Ross., viii., p. 315; Rom., Mem., ii., t. xvi., fig. 1.	*Irkutsk.*
32. KALMUKA, *Alph.*, Lep. Kuldja (Hor. Ent. Ross., 1881), p. 81, t. 18 ♂, 19 ♀.	*Kuldja mont.*
33. RADIANS, *Stgr.*, S. E. Z., 1886, p. 240.	*Kuldja mont.; prov. Ferghana mont.*
34. TYNDARUS, *Esp.*, 67, 1 (1781); *cf.* Ob., Et. Ent., viii., p. 25.	*Alp.; Pyr.; It.; Hung. et Gal. mont.*
callias, W. H. Edw., Trans. Am. Ent. Soc., iii., p. 274 (1871).	*Colorado.*
dromus, H.-S., 168—9, 275, vi., p. 8 (var. inconstans cum trans. ad *tyndarum* typicum et ad *hispanicam*; fasciis latis rufis, ocellis majoribus).	*Pyr.; Cauc.; It. mont.; Arm.*

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var. *hispania* (rect. *hispanica*), Butl., Cat., 86, t. ii., 7 (major, ocellis maximis, subt. unicolor).	*And. mont.* (*Sierra Nevada*).
var. *ottomana*, H.-S., 376, 379—80, vi., p. 8; Stgr., Hor., 1870, p. 67 (maxima, fascia fere obsoleta, subt. unicolor).	*Græcia mer. mont.; Bith.; Arm. mont.*
var. *sibirica*, Stgr., S. E. Z., 1881, p. 270 (? nomen vix conservandum trans. ad *ottomana* et *dromus*).	*Tarbagatai.*
35. GORGE, *Esp.*, 119, 4, 5 (*ante* 1800?); Hüb., 50, 2—5.	*Sum. Alp. Pyr.*
var. *triopes*, Speyer., S. E. Z., 1865, p. 248 (al. ant. ocellis 3 apicalibus).	*Sum. Alp.* (*cum forma typ. mixta*).
var. *gorgone*, B., Ic., 29, 5—8, i., p. 150; H.-S., 75, 76 (major, ♂ subt. minus variegata, ♀ venis albicantibus, ? transitus ad *goantem*).	*Sum. Pyr. cent.*
var. ? *gigantea*, Ob., Et. Ent., viii., t. i., 7.	*Asturias mont.*
36. GOANTE, *Esp.*, 116, 1 (*ante* 1800?); H.-S., 77, 79.	*Alp.*
37. PRONOE, *Esp.*, 54, 1 (1780); Hüb., 215—17.	*Alp.; Styr.; Gal. It. et Hung. mont.; Cauc.; Bith. mont.; Arm.; Sib.*
var. *pitho*, Hüb., 574—7 (? inconstans, obscurior, fasciis rufis subnullis).	*Alp., etc.; Pyr.*
var. *pyrenaica*, Stgr. (inconstans, nom. haud conservandum).	
? var. (mihi nat. ignota) *melancholica*, H.-S., 276—9, vi., p. 10.	*Ararat; Arm. mer. occ.*
38. ÆTHIOPS, *Esp.*, 25, 1, ♂ (1777), 63, 1, ♀. *medea*, Hüb., 220—2. *blandina*, Fab., Ent. Syst., 236 (1793).	*Eur. ç.; Angl. sept. Liv.; Turc. s. or.; Cauc.; Alt.*
var. vel bona sp., *neoridas*, Boisd., Ind., p. 23; Ic., 29, 1—4 (pallidior, ♂ subt. minus fasciata).	*Gal. mer. alp. et mont.*
39. ZAPATERI, *Ob.*, Ann. Soc. Esp., iv., p. 370, t. 17, 1, 2 (1875).	*Catalonia; Aragon; Albarracin.*
40. SEDAKOVII, *Ev.*, Bull. Mosc., 1847, iii., 70, t. i., 5, 6; H.-S., 591—2. *niphonica*, Jans., Cist. Ent., ii., p. 153, t. v., 5 (1877).	*Sib. or.; Amur sup. et inf.; Japan mont.*
41. LIGEA, *Linn.*, Syst. Nat., x., 473; Hüb., 225—8.	*Eur. cent. et sept. mont.; Bulg.; Cauc.; Sib.; Scand. mt.*
var. *ajanensis*, Men., En., ii., p. 104, 1855. *eumonia*, Men., Schrenk's Reise, p. 34, t. iii., 4.	*Amur. inf.*

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var. (trans. ad *euryale*) *adyte*, Hüb., 759—60 (subt. magis albo-fasciata, supra fasciis luteis); *cf.* Schilde, S. E. Z., 1873, p. 179. — *Lap.; Fen.; Alp., etc.; Scand. sept.*

var. *jeneseiensis*, Trybom, Ofver. Vetensk. Akad. Forh., 1877, p. 46 (? var. constans et distincta; non vidi). — *Jenesei flum.* 62°—68° *N.*

var. *livonica*, Teich., S. E. Z., 1866, p. 133 (al. post. subt. unicoloribus brunneis). — *Liv.; Finland; Tyrol* (*coll. Zeller*).

var. *euryale*, Esp., 118, 2, 3; Hüb., 789—90; *cf.* Meyer-Dür, p. 177. — *Alp.; Pyr.; Sib.; Hung. et Gal. mt.; It. cent. mt.; Alt.*

ab. vel var. inconstans *ocellaris*, Stgr., Cat., p. 11 ("supra maculis parvis [non fascia] rufis, nigro-punctatis"). — *Alp.; Sib.* (*Irkutsk*)

var. *euryaloides*, Tengstr., Cat., p. 5 (ocellis subnullis). — *Fen.; Ross. occ. et bor.*

42. EMBLA, *Thunb.*, Diss. Ent., ii. (Dec., 1791), p. 38, t. f. 8, 8. — *Scand. cent. et bor.; Ross. sept.; Sib. bor. ad* 70° *N.; Amur. sup. et inf.*

43. DISA, *Thunb.*, *l. c.*, p. 37; Freyer, 416, 1, 2. — *Lap.; Ross. bor.; Sib. bor. ad* 70° *N.*

griela, Hüb., 228—9.

? var. *mancinus*, Doubl. Hew., Gen. Di. Lep., ii., p. 380; Atlas, t. 54 (1850—52). — *Am. bor.; Alaska; Brit. Columbia.*

? var. vel bona sp. *rossi*, Curt., App. Ross. Voy., p. 67, t. A, 7 (1835). — *Am. arct.* 67°—68° *N., Boothia felix.*

Aurivillius Ins. Vega Exp., iv., p. 75, t. 1, 4, 1885 (minor obscurior minus ocellata). — *St. Lawrence Bay, N.E. Asia.*

44. FASCIATA, Butl., Cat. Sat. B. M., p. 92, t. 2, 8 (1868). — *Am. arct.* (*Winter Cove, Cambridge Bay, exp. Collinson*).

var. ? minor minus fasciata. — *Hudson Bay, fide Strecker ex Geffcken.*

45. CYCLOPIUS, *Ev.*, Bull. Mosc., 1844, iii., 590, t. 14, 3, *a, b*; H.-S., 607—8. — *Sib. cent. et or.; Am. sup. et inf.; Ural.*

var. *intermedia*, Trybom, Ofver. Vetensk. Akad. Förh., 1877, p. 46 ("al. post. subt. puncto medio ac tribus submarginalibus albis"); forma intermedia an *tristis* referenda? — *Yenesei*, 65° *N.*

46. AFRA (*afer*), *Esp.*, 83, 4, 5 (1783). — *Ross. mer.; Sib; Tarbagatai.*

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var.? *dalmata*, God., Enc. Meth., p. 530 (major, subtus magis unicolor, ? inconstans).	*Dalmatia; Askabad, N. Pers.* (*fide Christoph.*).
47. PARMENIO, *Boeb.*, Nouv. Mem. Mosc., ii., p. 306, t. 19; H.-S., 421—2, 464—6.	*Sib. cent.; Amur. sup.*
var. (vel. ab.?) *inocellata*, Graes., Berl. Ent. Zeit., 1888, p. 96.	*Amur. sup.* (*Pochrofka*).
48. TRISTIS, *Brem.*, Bull. Acad., 1861, t. iii. *wanga*, Brem., Lep. Ost.-Sib., p. 20, t. ii., 1.	*Amur.*
49. ERO, *Brem.*, *l. c.*, p. 20, t. ii., 2; Trybom, *l. c.*, p. 48 (? bona sp. vel var. *disa* affinis; al. post. subt. punctis albis distinguenda).	*Amur.; Yenesei*, 78° *N.* (*Trybom*).
50. EDDA, *Men.*, Midd. Reise, p. 58, t. iii., 11 (1851): Graeser, Berl. Ent. Zeit., 1888, p. 96.	*Amur. sup. et inf.*

Species incerti sedis; transitus ad genus Callerebia:—

51. MYOPS, *Stgr.*, S. E. Z., 1881, p. 296.	*Alatau mont.*
var. *tekkensis*, Stgr., S. E. Z., 1886, p. 241.	*Kizil Arvat, N. Persia.*
! *maracandica* (apud Christoph., Rom., Mem., i., p. 105).	
? bona sp. vel trans ad *maracandica*.	
52. MARACANDICA, *Ersch.*, Lep. Turk., p. 17, t. i., 13 (1874).	*Alai mer.; Pamir; Karategin.*
53. KALINDA, *Moore*, P. Z. S., 1865, p. 301, t. xxx., 5, ♀; Marsh. & de Nicé., Butt. Ind., p. 241.	*Him. occ.* 9—13,000 *ped. alt.*
54. SHALLADA, *Lang*, J. As. Soc. Beng., xlix., pt. ii., p. 247 (1880); Marsh. & de Nicé., Butt. Ind., p. 241, t. xv., 42, ♂.	*Him. occ.* 6—8000 *ped. alt.*
55. MANI, *de Nicé.*, J. As. Soc. Beng., xlix., pt. ii., p. 247 (1880); Marsh. & de Nicé., Butt. Ind., i., p. 242, t. xv., 43, ♂.	*Ladak.*
var. *jordana*, Stgr., Berl. Ent. Zeit., 1882, p. 171 (major, fascia lutea al. ant. minus extensa).	*Namagan; Khokand mont.*
var. ? *roxane*, Grum-Grsh. Rom. Mem., iii., p. 401, 1888 (an bona sp. al. post. supra distincte rufo-fasciata, subtus punctis albis subnullis).	*Pamir.*
56. HADES, *Stgr.*, Berl. Ent. Zeit., 1882, p. 172.	*Alai mont.*

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57. SAXICOLA, *Ob.*, Et. Ent., ii., p. 32, t. iv., i. (1876). *Ourato (Mongolia).*

EREBIA PATAGONICA, *Mabille*, Bull. Soc. Phil., 1885 (7), ix., p. 55 (non vidi, an hujus generis?). *Patagonia.*

I will now give some short notes on the various species, to explain the synopsis; as it must be observed that many of these conclusions are doubtful, and cannot be looked upon as settled until more complete information is obtained about the species.

E. epiphron.—After examining a very large number of specimens, I can only say that though the form *cassiope*, which represents the species in the Alps, is very different in typical examples from *epiphron* of the Hartz Mountains and Silesia, yet it is so variable that in the Pyrenees especially, and also in Scotland, it cannot be looked on as constant. The varieties *vogesiaca* and *pyrenaica* connect it with *epiphron*, and the form *nelamus* is an extreme variety or aberration in which the ocelli have almost or entirely disappeared. In the Balkans and Carpathians, from whence however I have seen but few specimens, the type is rather that of *epiphron* than *cassiope*.

E. kefersteinii I only know from Eversmann's description and Herrich-Schäffer's figure, which shows no characters by which it may be distinguished; and it may turn out that *tundra*, which Staudinger says comes between *cassiope* and *melampus*, is the same, though the band on the under side of the hind wing, which is clearly shown in the figure, seems to distinguish it clearly, and to indicate some affinity with *lappona*. *Tundra* has only been found near Lake Baikal, where a form of *melampus* is also said by Staudinger to exist.

E. melampus is a small species, which extends to the Carpathians and Riesengebirge; the var. *sudetica*, from the latter range, does not seem sufficiently well marked to bear a separate name, though typical specimens from Silesia can be recognized.

E. eriphyle remains, after all that has been written by Meyer Dur, Christ, Rothenbach and others, a somewhat doubtful species. All those who have seen it alive, however, consider it to be a distinct one, and though the characters are difficult to describe, and seem somewhat liable to vary, there is no difficulty in recognizing what

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are called typical specimens, and there may be occasional hybrids between *melampus* and *pharte*, which are taken for it. Christ says it is nearest to *pyrrhula*, which is a somewhat local high alpine form of *manto*. *E. eriphyle*, though extending from Central Switzerland to Carinthia, seems much more local than any other alpine *Erebia*, and it is to be hoped that now it is better known, further observations will be made on it.

Of *arete*, *mnestra*, and *pharte* little need be said, as they are species little subject to variation and of limited distribution.

E. maurisius, *pawlowskyi*, *haberhauseri* and *kindermanni*, form, with *theano*, a group apart, distinguished by the pale colour of the cell of the fore wing. The name *maurisius* was given a century ago, by Esper, to a species from Siberia which has never been certainly identified.

E. pawlowskyi is also unknown except by description, and *haberhaueri* is almost certainly a mountain form of it. *E. kindermanni* is described from a pair in Lederer's collection from the Altai, and the description agrees well with specimens I received from Herr Tancré from the same mountains, which have, however, been since identified by Staudinger with *maurisius*. I am inclined to think that these four names represent one species, though I do not know it well enough to say so with certainty. *E. sofia* is described by Strecker as being on the upper side an almost exact counterpart of *kefersteinii* (probably he meant *haberhaueri*, which was sent out by mistake under this name).

E. manto is a variable species in which the female differs more from the male on the under side than any other. In the commoner alpine form it is marked above with a distinct band of rufous spots containing ocelli, and the female has a distinct yellowish or sometimes whitish band at the base of the hind wings below, as well as an outer band of the same colour; but in the form called *cæcilia* these bands in the males are quite obsolete, and the colour is a very dark unspotted brown. I cannot, however, see that the form called *vogesiaca* by Christ, of which I have specimens from himself, is at all different from those which I have taken at Kandersteg in Switzerland, and which I at first took for a variety of *pharte*. There is also a small form called *pyrrhula*, Frey, which is referred to *manto* and considered by him to be a high

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alpine form of it. This seems rare and local in Switzerland. Meyer-Dur considered *cæcilia* to be a form of *glacialis*, but in this I cannot agree with him, as I have taken it both in the Alps and Pyrenees in localities quite unlike, and widely separated from, the stony slopes which *glacialis* inhabits.

E. ceto and *œme* are both distinct species. Gumppenberg says that the var. *hippomedusa* connects *ceto* with *medusa*, and var. *spodia* connects *ceto* with *œme;* but I have seen no specimens of either that I should consider doubtful, though the variation in the ocelli is very great in both these species.

E. medusa.—This is a very wide-ranging species, which extends from Germany to the Upper Amur and the North of Scandinavia. It is supposed by Strecker, who quotes Staudinger in support of his opinion, to be inseparable from *epipsodea*, Butl., a species which inhabits the Rocky Mountains and extends north to British Columbia. I have no specimens of *medusa* from Siberia for comparison, but all my European specimens may be easily distinguished from the American species by the absence of the band on the hind wings below; this band is more or less present in the vars. *uralensis*, Stgr., and *polaris*, Stgr., and it may be that specimens of these forms occur which connect *medusa* with *epipsodea*, though I have not seen them.

Von Gumppenberg separates *polaris* specifically from *medusa* on account of the difference in the hind wings below, and makes *uralensis* a variety of it, placing them next to *epipsodea;* but I am not at present able to concur in this opinion.

I have a single specimen and Mr. Godman has a similar one collected by Bruce in Cashier Valley, Summit County, Colorado, at 12,000 feet, which are considered by Bruce and W. H. Edwards to be a variety of *epipsodea*, though it is so different from it that had I more specimens I should be inclined to consider it as a different species, more especially as *epipsodea* does not appear to extend to such great elevations or to vary much; though its range of altitude is very great. I have taken it in Idaho at about 2000 feet elevation, and in the Yellowstone Park at 5—6000 feet, and have it from Colorado, taken by Bruce as high as 9500 feet.

The specimens above mentioned are somewhat smaller

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and with rounder wings than the average of *epipsodea*, but are best marked by the entire absence of ocelli on either wing or on either surface and the partial disappearance of the red band. Though I do not attach great importance to ocelli in the *Erebias* as a specific character, yet these specimens are certainly a well-marked variety, and among thirty specimens of *medusa* and sixteen of *epipsodea* I have none in which the ocelli on either fore or hind wing are wanting.

E. psodea, Hübn., which by Staudinger is treated as a form of *medusa*, confined to South-eastern Europe, but which is recorded also from Monte Baldo, in Italy, is separated specifically by Von Gumppenberg, but the characters which he relies on are not visible in my specimens from Eperies, in North Hungary.

E. stygne.—This species, though it has not a very wide range, is extremely variable, but none of its varieties seem sufficiently fixed to have received names. It is extremely abundant in the Pyrenees, where some of the females have a pale band, almost white, on the under side of the hind wings; and both sexes have the bands and ocelli wider and more conspicuous than is usual in the Alps, where both are sometimes almost, if not quite, obsolete. Some Pyrenean specimens come so close to *evias*, which occurs with it, but has a rather higher range, that I can hardly distinguish them except by the under side of the hind wing; and others are somewhat like some specimens of *nerine*, which apparently represents it in the Eastern Alps.

E. evias, in Switzerland, occurs in the hot parts of the Valais, at a low elevation, and flies early in the season; in the Pyrenees it ascends to 6000 or 7000 feet, and is found also in the mountains of Central and Eastern Spain.

E. melas is a species which varies extremely, and may perhaps be separated into two or three forms, of which the typical *melas* is found in the Pyrenees, and in South-eastern Europe from Carniola to the Carpathians and Greece.

The variety *lefebvrei*, Boisd., with much larger ocelli, and in some specimens, especially the females, with a broad band on the fore wings, occurs in the Central Pyrenees, and again, as *hewitsoni*, in Armenia, Georgia, and Suanetia. This last is separated specifically by Von Gumppenberg, and seems to me as near to *evias* as to *melas*; but strange to say, neither form is found in the

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Alps or in the mountains of Asia Minor, and the Central Pyrenean and Armenian forms resemble each other as much as those of the Central and Eastern Pyrenees. A more remarkable case of interrupted distribution without apparent cause, and of similar variation in the extreme points of the range, is hardly to be found in any other species. It occurs also in the mountains of Asturias (var *astur*, Ob.) and in Central Spain. The only female from Greece which I have examined has the under side of the hind wing mottled in a different way to any of the females of either Pyrenean form.

E. meta and its var. *gertha*, Stgr., from Osch and Namagan, in Eastern Turkestan, are not nearly allied to any European species, though they seem to me too close to *E. mopsos*, Stgr., which comes from the same mountains. Staudinger, however, after comparing large numbers of both, thinks them distinct. *Alexandra* is another form from the same region, which Staudinger places as a form of *mopsos*, but Von Gumppenberg calls a synonym of *meta*. I expect all these four will have to be united as one species eventually, though my materials are not sufficient to enable me to do so with certainty at present.

E. turanica, Ersch., and var. *lœta*, Stgr.—A very distinct species, which Staudinger places between *pharte* and *theano*, is found in the Alatau, Namagan, Kuldja, and other parts of North-Eastern Turkestan, and has no near allies either in Europe or Asia as far as we know yet. The series of white spots, sometimes coalescing into a band on the under side of the hind wing, distinguish it at a glance.

E. glacialis is a very distinct species of the high alps, which is almost entirely without ocelli, though aberrations rarely occur in which they are present. It has no near allies in Europe or Asia, but in the highest peaks of Colorado, frequenting the same stony rocky slopes as *glacialis*, is found a species which considerably resembles it, namely, *E. magdalena*, Streck. An excellent account of this rare species, of which I have lately received specimens from Mr. Bruce, is given, with figures, in a recent part of Edwards' 'Butterflies of North America'; and I may here note that *E. haydeni*, which he figures with it, and of which I have both sexes from the Yellowstone Park, is, I believe, a *Cœnonympha* and not an *Erebia*.

E. scipio, Boisd., and *epistygne*, Hüb., are two species

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confined in their range to the mountains of Southern and South-eastern France. The former seems most nearly allied to *nerine*, the latter to *evias*, but both are well-marked species, and seem to be subject to little variation.

E. afra, Esp., and *dalmata*, God., are by Von Gumppenberg considered distinct from each other, but Staudinger places *dalmata* as a variety of *afra*, and the specimens I have seen from the Mützell collection differ only in their rather larger size and less distinct marking below. It must be either very local or very rare, as so good a collector as Josef Mann never got it in three summers which he spent in Dalmatia, but it is said to occur at Sebenico and Obrova in that country. Christoph also notes its occurrence in the mountains near Askabad, in North Persia, and treats it as a var. of *afra*; *afra*, however, is a very distinct species from any other, and is found in South-eastern Russia, as well as in Turkestan and North Persia. Its nearest ally seems to be

E. parmenio, Boeb.—A large and distinct species, which is found in Eastern Siberia as far south as Kiachta and on the Upper Amur region. It seems, like *afra*, to be an inhabitant of lowland and not of alpine districts. A form of it without ocelli is described by Graeser as *inocellata*.

E. lappona is one of the most distinct and commonest species in the high Alps, Pyrenees, and Scandinavia, and occurs also in the Altai, but not in any intermediate mountain ranges, or in Arctic America or Asia. This is a curious instance of sporadic distribution with general but no marked local variation, for the two named forms of this, *pollux*, Esp., and *sthennyo*, Grasl., are hardly worthy of separation. Though the latter seems to be the typical form in the Central Pyrenees and not to occur elsewhere, it is not as yet a fixed variety, as ordinary specimens of *lappona* are found with it. I have also a specimen of *lappona* labelled "Balkan," but I do not know on whose authority, and can find no published record of its occurrence there.

E. dabanensis is a species described by Erschoff from a single specimen in his collection taken near Irkutsk. From the figure it seems nearest to *lappona*, but with ocelli on the hind wings, and may be a form of it or a distinct species.

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E. discoidalis, Kirby, is a very peculiar species, which extends from Pochrofka on the Upper Amur to the banks of the Yenesei River, in lat. 70° N., and also occurs on the western shores of Hudson Bay, from whence I have specimens. It will probably be found in other parts of North-eastern Asia and North-western America, but I have not had the opportunity of comparing Asiatic with American specimens. Though placed by Staudinger, who perhaps had never seen it, after *disa*, it seems to me most nearly allied to *ocnus*.

Next we have a group of so-called species from the high mountains of Turkestan, namely, *ocnus*, Ev., *tartarica*, Ersch., *sibo*, Alph., *thianshanica* (? Staud. MSS.).

Of these I have *ocnus*, from the Alatau and Tarbagatai, which I cannot agree with Von Gumppenberg in treating as a var. of *lappona*, and what were sent as *thianshanica*, from Kuldja and Transili, by Staudinger, which differ in their greater size and the absence of the reddish brown on the fore wings, which is distinct in *ocnus*.

This *thianshanica* is exactly represented by Alpheraky's plate of *sibo* male, whilst his figure of *sibo* female, which is much smaller and more distinctly banded below, represents exactly what I received as *tartarica* from Erschoff (but of which I can find no published description), and in both sexes as *sibo* from Alpheraky himself.

It seems from this rather scanty material that *ocnus* is a good species distinct from *lappona*, and that *sibo*, *tartarica*, and *thianshanica* are another, which is variable both in size and in the colour of the under side, and that both of them should be placed, as Staudinger has done, in close proximity to *lappona*.

Near to *ocnus*, but well distinguished by the shape of the wings, in the male especially, and probably belonging to a different group, we have *E. radians*, Stgr., with var. *usgutensis*, from Osch and the South-eastern Altai; and *E. kalmuka*, Alph., from the Kuldja district. Both of these seem quite distinct, especially the latter, which has the costa and margins of both wings of a silvery grey colour, quite unique in the genus.

E. tyndarus.—This species has the widest range of any non-arctic species, and occurs abundantly in the Alps, Pyrenees, Spain, Greece, Caucasus, Central Asia, and in the mountains of Colorado. It has been divided by

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Von Gumppenberg into three species, namely, *tyndarus*, of which he makes *callias*, Edw., the Colorado form, a variety; *dromus*, H.-S., of which he makes *hispanica*, Butl., a variety; and *ottomana*, H.-S. Staudinger makes both *dromus*, *ottomana*, *hispanica*, and *sibirica* simple varieties of *tyndarus*. My own collection of this species is very rich, comprising 30 specimens selected out of hundreds from the Alps, 30 from the Pyrenees, 18 from the Sierra Nevada of Spain, 3 from the mountains of Asturias, 4 from Greece and Asia Minor, 5 from the Caucasus, 1 from Siberia, and 12 from Colorado. After a careful study of them I am unable to separate any except *ottomana*, as a variety, which is sufficiently fixed and invariable to be constantly recognised; though *hispanica* is easily distinguishable from the alpine form, and only connected with it through the very variable forms of *dromus* which occur in the Pyrenees. I can give no opinion as to the variety *sibirica* from Tarbagatai, which Staudinger says forms a transition to *ottomana*, and if this is so, it may be that even *ottomana* is not capable of exact definition, though it is certainly very unlike the typical *tyndarus*, and would, without the intermediate forms, be considered abundantly distinct. As to *callias*, I feel confident that it is at best but a variety, the only character by which I can recognise it being that the reddish patch on the fore wing below is extended inwards parallel to the costa in a manner which is only occasionally seen in other forms; though this character is found in some specimens from Asturias, Greece, the Caucasus, and Siberia. Von Gumppenberg gives as a character, "Alis post. subtus nigro-punctatis," but this is not constant in Colorado specimens, or always absent in European ones.

E. gorge is another very variable species confined to the Alps and Pyrenees, in both of which it frequents only high elevations. Von Gumppenberg separates *triopes* as a species on account of the supposed difference in its habitat and habits, but I have taken both flying together both in the Engadine and on the Albula Pass. As to the variety *gorgone* from the Pyrenees, I must repeat what I said in these 'Transactions,' 1887, p. 398, *viz.*, that though typical *gorgone* seems fairly distinct, yet it seems to be connected with *gorge*, also found in the Pyrenees, by intermediate forms.

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The next group consists of five or perhaps six species, all nearly allied to each other.

Of these *pronoe* and *æthiops* are the best known and most widely distributed, the former extending from the Pyrenees to Eastern Armenia, the latter from England to Eastern Siberia. Both of them vary considerably.

E. neoridas, Boisd., which Staudinger treats as a distinct species, Von Gumppenberg makes a variety of *æthiops*, and perhaps he is right in this; but *sedakovi*, Ev., from the Amur and Japan, which he treats in the same manner, is, I think, constantly separable, though I have no Siberian specimens of *æthiops* for comparison with it, and intermediate forms may occur. Neither Ménétries, Bremer, or Graeser seem to have found *æthiops* in Amurland, and I do not know Staudinger's authority for its occurrence there.

E. zapateri is a species which seems quite distinct, and is confined to the mountains of Aragon and Catalonia in Spain.

E. melancholica, H.-S., is unknown except from the figure, and has been found by no recent traveller. Staudinger thinks it may be a var. of *neoridas* or rather *æthiops*, and the figure given by Herrich-Schäffer might well represent a form of *pronoe* which occurs in the same region.

E. sedakovi is the eastern representative of *æthiops*, to which it is nearly allied, and is not distinguishable from the Japanese form which has been called *niphonica*: it extends to the Upper Amur region, and may be found farther west.

The next species on the list is *E. ligea*, a very wide-ranging and variable species, which occurs in almost all parts of Central and Northern Europe and Asia. *Euryale* is by many considered a distinct species, and in the Alps seems to be so, and found at a higher elevation than *ligea*; but intermediate forms occur in Northern Europe under the name of *adyte* which seem to make an exact definition of the two species impossible; and both Lederer, Herrich-Schäffer, and Schilde have held the same opinion as I do. In Asia it takes other forms, of which *ajanensis*, occurring in the Amur region, is one, and *jeneseiensis* another. I have not seen any typical *euryale* from Asia, though it is reported to occur in the Altai Mountains.

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E. embla, *E. disa*, and *E. fasciata* are boreal forms of wide range, and though nearly allied and variable in size and ocelli, are distinguished by constant characters, so far as I have seen. *E. rossi* may be distinct, but it is so rare that I cannot say so, and the only specimens I have seen look like an arctic variety of *disa*, to which also *mancinus* seems to belong.

E. cyclopius and *tristis* are excluded from the genus *Erebia* by Von Gumppenberg, who says they are nearer to *Satyrus dryas* and *actea*, but I do not see any reason for separating them myself.

E. ero and *edda* are two little-known species from Eastern Siberia, of which I know too little to speak with certainty. They are both distinguished by white spots on the under side of the hind wings. *E. ero*, from the figure, might be perhaps a form of *disa*, but I have never seen a specimen.

We have now a small number of eastern species which appear to form a transition to the genus *Callerebia*, Butl., which represents the genus in the Himalayas and China. They are principally distinguished by the different shape of the hind wings, but I have not been able to detect any structural characters upon which a subgenus could be defined, and they are not very nearly allied among themselves.

E. myops is a very distinct species, which differs in the colour of the hind wings below from any other; it seems to occur both in the mountains and in the steppe or low hills which border it in North Persia.

E. maracandica, *E. kalinda*, and *E. shallada* form a group which, from the material at present existing, seem distinct species, but *maracandica* and *kalinda* may be connected by other varieties which probably occur in the region of the Pamir.

E. mani is another inhabitant of the highest regions of Central Asia, and is inseparable, I believe, from the form named *jordana* by Staudinger; but *roxane*, of which I have only seen three specimens, though closely allied, has a red patch on the hind wings, which may indicate a distinct species or variety.

E. hades is another fine species, which might perhaps be placed near *tristis*.

Whether *saxicola* is a good species or not I cannot

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say. It may be a *Callerebia*, but all these newly-discovered Central Asiatic species are at present so rare that their classification must be deferred till we know them better.

E. patagonica, Mabille, is unknown to me, and may belong to another genus, but if not, it will be the only species in South America, as *E. vesagus*, Doubl., and *E. boisduvalii*, Blanch., from Chili, are not Erebias, but belong to the genus *Neosatyrus*, Wallengren.

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XII. *Note regarding* Delias sanaca, *Moore, a Western Himalayan Butterfly.* By Lionel de Nicéville, F.L.S., C.M.Z.S., &c.

[Read April 3rd, 1889.]

On page 161 of the 'Annals and Magazine of Natural History,' fifth series, vol. xvii., 1886, it will be found that I have given expression to the opinion that there are three good species of the genus *Delias* allied to *belladonna*, Fabricius, viz.:—"*D. belladonna*, West China to Kulu; *D. sanaca*, Western Himalaya; D. *belucha*, Beluchistan." I wrote the latter name from memory; it should be *D. flavalba*, Marshall, from Kunawar.*

I have lately had reason to modify this view; when I wrote the above I had but a single specimen of *D. sanaca* before me. Through the kindness of Mr. P. W. Mackinnon I have received fourteen males and five females of *D. flavalba* and *D. sanaca* from Masuri; and I have also before me six males of these two species also from Masuri, and five males and one female of *D. flavalba* (which constitute the type specimens of that species) from Kunawar, contained in the collection of Colonel A. M. Lang, R.E., captured by himself many years ago. As regards these latter specimens, Colonel Lang in discriminating them, and Major Marshall in describing them as distinct species, were quite justified; though both the Masuri and Kunawar groups of specimens are very variable in the amount of black markings they exhibit on both surfaces, there is no connecting link between them. My fresh specimens from Masuri supply this link. When arranged in a graduated series from the lightest-marked specimen to the darkest, at no point can you draw the line dividing them into two species. Regarding these specimens, Mr. Mackinnon (who is an old collector, and has known the

* Proc. Zool. Soc. Lond., 1882, page 759.

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species in life for many years) writes me:—"I am sending you ten more [*D. sanaca*] of five different shades as near as I can manage. I am sure the dark and light-coloured ones belong to the same species, as I got dozens of all shades in *one* place, and in *one* forenoon; they were all chasing each other, at times six or seven together. Mr. Angus Campbell has also captured some of them in Masuri, where it is not *very* rare: he got them ont he flowers of the horse-chestnut in May. Mine were all caught on open spaces in forests of the Mouroo Oak, *Quercus dilatata*. [Ticketed Nag Tiba, near Masuri, 8500 feet, latter half of May and beginning of June, and Tehri Gurhwal, near Masuri, 8500 feet, 10th to 20th June.] I have seen them *often* in Masuri, but captured them very seldom." I should remark of the female from Masuri, that none of them are as light-coloured as the palest male specimen of *D. flavalba*; in fact they vary too, but not as much as the males, the lightest specimens equal *D. flavalba* (type female), the darkest equal *D. sanaca*.

Major Marshall writes me on the subject:—"I am returning to-day your paper on *T. belladonna*. I think you are right in the matter. I would never have separated *D. flavalba* unless I had believed it to be confined to the dry western zone of the Himalayas, where the climate is that of Kunawar. Its occurrence at Masuri makes it climatically and geographically inseparable, though of course climate has a large effect in producing the prevalence of black or of white in the coloration of butterflies."

I will now leave the matter, only adding that it is more than probable that there is only one species of this group, *D. belladonna*, and that to prove it, it is only necessary to bring sufficiently large material together to connect all the described forms, of which I give a list below:—

D. belladonna, Fabricius, habitat of typical specimens unknown, probably occurs in Western China.

D. ithiela, Butler, described from Penang, but occurs in Sikkim and Assam.

D. berinda, Moore, figured on plate xii., vol. 1, of Waterhouse's 'Aid,' occurs in the Khasia Hills, probably a synonym of the last.

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D. hearseyi, Butler, described from Barrackpore! True habitat unknown.*
D. boyleæ, Butler, Sikkim.
D. horsfeildi, Gray, Nepal.
D. sanaca, Moore, Western Himalaya, but recorded by Mr. Moore in Cat. Lep. Mus. E. I. Co., from Darjeeling!†
D. flavalba, Marshall, Kunawar.

[I must apologise both to Mr. de Nicéville and to the Society for the delay in the publication of this note, which was sent to me just as I was leaving England last year. As Mr. de Nicéville asked me to make any comment upon it which might seem useful, I may now say that his views entirely concur with my own as expressed in the 'Annals of Natural History,' and in this Society's 'Transactions' of last year.

But I do not think it can be any longer doubtful that whatever views may be still held as to the specific distinctness of *D. ithiela*, Butler, and *D. sanaca*, Moore, from *D. belladonna*; *D. berinda*, Moore, is a synonym of *ithiela*, whilst *D. boyleæ* and *D. hearseyi*, Butler, are both synonyms of *horsfeildi*. As I have now had an opportunity of seeing a large number of *belladonna* collected near Ichang, in China, by Mr. Pratt, which are in Mr. Leech's collection, I may further add that they have the broad yellow abdominal patch and white inner margin on the hind wing of *horsfeildi*, with something of the duller black and less white markings of *ithiela*; but they may be distinguished from Himalayan forms, in common with my specimens from Tsekou, in South-east Tibet, by the more elongated spots on the under side.

In this case, as in many others, the light which is thrown on the question by increased numbers of specimens from fresh localities, all goes to prove that a very wide range tends to produce variation; and that the greater our knowledge of wide-ranging and variable species, the greater becomes our difficulty in defining the varieties.—H. J. Elwes.]

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* Almost certainly from Sikkim.

† This is a mistake. It is the form known as *horsfeildi* which occurs in Sikkim.—H. J. E.

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XIII. *Notes on Indian ants.* By George Alexander James Rothney, F.E.S.

[Read April 3rd, 1889.]

The following notes (which I have been encouraged to offer to the Society by the kind assurance of my friend Mr. Edward Saunders that they might be of some interest to hymenopterists) are confined to my written memoranda of a few only of the more conspicuous or interesting of the Indian species which have been constantly under my observation from March, 1872, to March, 1886.

Now that I have left India, I often feel sorry I did not turn to better account such a splendid field for the study of these most fascinating insects, but the calls and duties of a business life, and the necessity of spending much of one's spare time in outdoor sports, which in India means not only relaxation but health, very greatly reduce the leisure available for steady entomological work, and, as these notes will show, almost restrict one's observations to Sundays and holidays; still there have been many neglected opportunities, and I shall always regret having failed to find the female of *Dorylus*, and to dig up a satisfactory nest of *Holcomyrmex indicus*.

Looking back on Indian ants generally, it is strongly impressed upon my mind by many an unrecorded observation that not only do different species vary as widely in habits and character as do the numerous and distinct nationalities inhabiting this wonderful country, but that individuals of the same species will occasionally exhibit, when under apparently similar conditions and circumstances, different little traits and dispositions, so that if you attempt to fix any hard and fast lines as to ant-conduct you are apt to find your calculations and theories somewhat upset.

Mr. Edward Saunders has kindly assisted me in determining some of the ant-puzzles, and I am happy

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to say that my Indian collections of Hymenoptera are now in Mr. Cameron's able hands for description.

Camponotus compressus, *Formica compressa*, Fabr. The Black Ant of India.

This species is very common in Bengal, and can be seen in numbers almost everywhere, but it becomes comparatively rare as you get up-country to Oudh, the North-west Provinces, and the Punjaub, where its place seems to be taken by *Myrmecocystus viaticus;* the two species can be taken in the same locality, but as *viaticus* becomes common, *compressus* is seen less frequently: Benares, Agra, and Lahore are good illustrations of this. *Compressus* is very common in Madras, and I have also taken it in Bombay. The nests are formed in the earth at a depth of several inches, generally under the shelter of trees, and are very populous. The sexes swarm in May or early June, and take flight as soon as the sun goes down. Stray specimens of the sexes, however, may be taken at light from the commencement of the hot weather to the end of the rains (April to September). The workers-major are very fierce and strong, and attack when disturbed with the greatest courage; if you allow them to fasten on your hand they can draw blood with ease, their strong mandibles cutting like a pair of nail-scissors; and when once they get a good hold, unless you unlock their jaws, they will leave their heads fixed in the wound rather than loosen their bull-dog grip.

It is amusing to watch the havoc these big workers will play with the white ants (Termites) whenever they get the chance. Very probably the trunk of the tree under which *compressus* has formed its colony will be plastered with the covered ways of Termites; take a stick and uncover these, and *compressus* will immediately rush in and carry off the soft helpless Termites to their nest; but they never have the sense or industry to open up any of these prolific finds for themselves, even when the key or start is given them, although with their immense strength they could very easily do so.

It is a very common occurrence to find evidence of deadly family feuds between these warriors, such as two lying dead, locked together, and another walking about with a big head fixed to a leg or antenna: but of many

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observations of a similar character, I will relate the details of a particularly desperate fight that took place in the verandah of my bungalow in Barrackpore between a worker-major (not a very big specimen) and a nest of that pungently stinging ant, *Solenopsis gemminatus*. One afternoon in May, 1880, at 4.30 p.m., I noticed a worker of *compressus* very busy skirmishing round a column of the verandah, in which was a strong colony of *Solenopsis*; she contented herself for some time in cutting off and snipping in two the stragglers from the nest, but by-and-bye she became bolder, and came closer to the nest, seizing and cutting away with the most systematic determination; by stooping down a little you could distinctly hear the snip, snip of the mandibles as they severed heads and bodies of the apparently unoffending *gemminatus*. This went on till 5.30, when *compressus* commenced an attack on the main entrance to the nest itself; and now the fight became more general. After a rapid dash at the entrance *compressus* would retreat, covered with these little red ants; some would be jerked off, but the more pertinacious required individual clearing, and I noticed *compressus* adopted a very clever plan of freeing her legs from the enemy: say one or more ants were holding on to her leg, she would then encircle that limb with her mandibles above the hold of the red ants, and then, instead of moving the jaws, would draw the leg through, a process very like shredding currants; of course *gemminatus* would often get a hold where this process could not be applied, but *compressus* always managed to free herself at last, and then off to the entrance again for a fresh attack. Twice while watching, *compressus*, covered with red ants, rolled from the base of the column to the steps below, but as soon as she freed herself, up she mounted again and renewed the fight. At 6 o'clock I went for the usual evening drive, and left my friend hard at it. On my return at 8 the fight was still going on, although it was then dark, and *compressus* was showing evident signs of exhaustion. At 9.30 I went out again to see how matters stood, and found *compressus* still alive, but covered with foes and almost done to death. I picked her up, cleaned off the red ants, brought her indoors, put her in a comfortable open box, and prepared some syrup of sugar and sherry, but on going to the box the next morning I was grieved

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to find her stiff and dead. I have always regretted I did not mix her syrup with brandy or port instead of sherry, but I fear she was past recovery. After bringing her in the night before, I went back with a light and gathered up some of the dead from the battle-field, and of the odds and ends of heads and bodies. I made out next day some 53 slain, but the total must have been much greater, as I did not succeed in picking up in the defective light of a wall-lamp anything like the whole of the killed. I should be inclined to estimate the total as nearer 150 to 200. I did not observe any wounded; *compressus* did her work too effectively for that.

Beyond a pure love of a good scrimmage I can offer no suggestion as to any reason or cause for this fight; *gemminatus* was wholly unoffending, and *compressus* might have left the battle-field with colours flying any time from 4.30 up to 8 p.m. I have seen many instances of *compressus*' pugnacity when coming across other ants, or crossing close to another nest, but never such a systematic, determined affair as the one described. I have this Hereward of ants in my collection now, with a few odds and ends of the slain. I have examined a great many nests of *compressus*, but have never succeeded in finding in them any other species of ants, Coleoptera, Aphidæ, or indeed insects of any kind.

Myrmecocystus viaticus (Fabr.).

Cataglyphis viatica.

This ant is common in the North-west Provinces, Oudh, and the Punjaub. I have also taken it in Tirhoot, but never in the Calcutta district. It forms its nests in the hard-baked earth in the most exposed situations, and seems to revel in the hot dry air and fierce sun of these parts. You can always find plenty of nests in the broken ground about Agra, and also in the pathways of the gardens at Benares. The workers, which vary immensely in size, can be found busy and active all the year round, but the sexes I have only obtained in May. The workers have a strong propensity for marching about in irregular lines of a dozen or twenty together; they march at a great pace, but I have never been able to detect any particular object in these excursions, and have never seen them attacking other ants, or bringing

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home any plunder. The workers-major, however, are very fond of carrying their smaller brethren when on the march, which they do by striding over and holding them clear of the ground with their mandibles; if you disturb them the big worker drops the little one, and each makes off on its own account, but if left alone, and you watch quietly for a little time, you may see the big ant pick up the little one and march on again in a great hurry, and as if to make up for the delay. I have examined many of the nests of this species, but never found any slave-ants or insects of any kind in them. The big workers are powerful ants, but do not possess the immense strength of the giant workers of *compressus*.

Camponotus sylvaticus, Oliv.

This is a common species in Bengal, and can be found on most tree-trunks; it delights in shade, and forms its nests (which are never populous) in the ground under leaves. The workers are very active and extremely fragile, and it is difficult to secure perfect specimens. Specimens even from the same nest will vary greatly in colour.

Polyrhachis lævissimus, Sm.

This ant forms its nests in the decayed wood of trees, covering the entrances to its burrows with a thick papyraceous material, which might be best described as a "small-hands" made in the substance of a "tissue"; it is by no means a common ant, and I have hardly found half-a-dozen nests during my residence in India, and these have all been in Bengal. My finest nest is situated in a tree (a species of Acacia) in Barrackpore Park, on the south side of the tennis-ground, close to the Chirya Khana (aviary). This nest has a web stretched across a portion of the decayed trunk fully 18 inches broad by 2 feet in length, and is very populous; this nest swarms about the commencement of the rains, June 15th to July 7th. It is a strikingly handsome species, with its shining jet-black head and body, relieved and set off by the red legs. It often reminded me of our English *F. fuliginosa* in general appearance and habits, and always seemed like an old friend, but though I spent many hours for many years watching

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this nest, I never detected any special trait or character worth recording. I never found any other species in the nest nor Aphidæ, and, as far as I could observe, the ants derived their nourishment from the rich, black, moist mould of the decaying wood. They are a gentle species of ant, and can be handled without inconvenience.

Polyrhachis Schrinax, Roger.

This ant forms its nest by binding together with one or two silky threads a couple of leaves of a shrub; it only contains a few individuals, and is decidedly rare. The same remarks apply to *Polyrhachis bicolor*, Smith.

Polyrhachis spiniger, Mayr.

This is a common species in Bengal, but the nests are not easily found; they are formed by web-work binding together a few twigs of a spiny shrub like a dwarf babool, and I have not found them in any other plant. This species was described from specimens taken in the Botanical Gardens, Calcutta.

Pseudomyrma bicolor, Guér., Sm.

Sima rufo-nigra (*nigrum*), Jerdon.

This species (the female of which is figured and described by Frederick Smith in the Entomological Transactions for March, 1875, from my specimens taken at Barrackpore) is very common in Bengal; it forms its nests in the dead (but not decayed) wood of trees, and it can always be met with scouring over the trunks, particularly of fruit-trees like the mango (*Mangifera indica*), baël (*Ægle marmelos*), and lychee (*Nephelium Lichi*). Though so generally common, the nests are not easy to find, and I only met with two thoroughly well-established colonies that could be visited and watched year after year (the first was situated in a tree in Barrackpore Road, opposite the Park-gates, just where the trunk-road turns off by the Club; the other in a small tree in the Park, in some waste ground by the viceregal kitchen-garden. These nests I have spent hours in watching from 1874 to 1886). It is a very pugnacious species, and attacks almost any insect that

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comes in its way; I say almost, for I have seen it distinctly avoid the big workers of *compressus*, and on one or two occasions also the workers of *Œcophylla smaragdina*, when placed at a slight disadvantage in the way of position and numbers; it is armed with a very powerful sting, which inflicts by far the most painful and lasting wound of any hymenopterous insect I am acquainted with, and I have had experience of the stings of most Indian bees, wasps, and ants. It is very possible this may be considered by many who know the ant as too high an estimate of its stinging powers, but there are stings and stings. I have had hundreds of casual ones, and thought no more of them than of the stings of a *Polistes* or *Pompilus*; but once allow this ant to get a firm hold with its mandibles, and then, doubling its body, plunge its sting, so to speak, up to the hilt, and go on stinging, and the result is an entomological experience that few would care to try again. I have had several of these little experiences, and will give the following details of the worst:—

I was out collecting in Barrackpore Park, and one of these ants got on my left hand and stung me just under a heavy snake-ring I was wearing. I was foolish enough to allow it to operate in the above-mentioned thorough fashion before I brushed her off, and never thought of removing the ring until the finger was too swollen to do so. On my return home I tried to reduce the swelling with ice, but without success; the whole hand puffed out, the inflammation extending right up the arm to the shoulder; the finger itself turned blue, and looked and felt like bursting. I spent a wretched night, and the first thing in the morning sent to the bazaar for a native jeweller (Johari), who cut the ring off for me, but it was a painful operation, and it was two days before I was quite right again. I was in perfect health at the time, and in football training, which will give some idea of the effect of the poison when *rufo-nigra* has sufficient time to make a really deliberate and well-sustained sting.

In my compound at No. 45 Cantonment, Barrackpore, I had a very fine baël-tree, covered every year with fruit, of which my mali (native gardener) was especially fond; but the tree was much frequented by *Pseudomyrma*, and little "Adjun-mali" never went up to pick the fruit

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without expressing many anathemas on this particular species of ant.

I have never found any swarming time for this species, but have taken specimens of the winged female at different times during the hot weather and rains, but generally in May; but altogether I have not captured more than about twenty specimens. From May 20th to 24th, in 1879 to 1882, I captured each year a single female sitting on a leaf of the mussel-shell creeper, *Clitoria ternatea*, on the east side of the Chirya Khana (aviary), Barrackpore Park, and in almost the same position. What the attraction for this particular spot was I could never make out, and there were no nests in the immediate neighbourhood.

Wherever you find this species in any numbers, if you watch a few moments, you will see a mimicking spider, *Salticus*, running about amongst the ants, which it very closely resembles in appearance, much more so in life than in set specimens placed side by side; in my two favourite nests I have seen numbers on the most friendly footing with the ants, though I have never seen them enter their burrows. I have never seen these spiders doing anything, or capturing any fly or other insect, though they are always very busy and in a great hurry; they are very quick in their movements, and are difficult to capture, and, being very fragile, good specimens are not very easily obtained. I have at times fancied I have seen them imbibing some of the moisture from the bark where it has been bruised or chafed, but I cannot be certain; they are evidently on a special footing with the ants, and are, I should say, the only friends *Pseudomyrma* has, with the exception of a sand-wasp, a new species of *Rhinopsis* since described by Mr. Cameron, which also very closely mimics *rufo-nigra*, and which, on first observing amongst the workers, I took to be the male. It is very active; I have seen three specimens (but only captured one), two at the nest in the Barrackpore Road, and one at the nest in the Park.*

S. rufo-nigra appears to be fairly omnivorous, preying

* It is perhaps curious and worthy of remark that a species of *Ampulex* should so exactly mimic this ant and mix with it on friendly terms, whilst another species, the handsome *compressum*, should behave towards it in the somewhat overbearing and rough manner I have elsewhere described.

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on live insects, such as flies, moths, other ants, or anything it can capture; it is also very fond of over-ripe fruit, and there is a species of fig in the Park, the fruit of which (about the size of a medlar) is always riddled with these ants. I have not, however, found it on carrion, as I have the workers of *Dorylus* and *Solenopsis*.

I have never observed the workers fighting amongst themselves in the immediate neighbourhood of their own nest, but on other trees it is not an uncommon occurrence to find little parties of six or eight engaged in deadly battle. In May, 1883, I found five couples locked in a death struggle on the trunk of a casuarina-tree; I secured them, and they did not let go their hold on being put in the collecting-bottle, but died as they fought. It seems probable that these were workers from different nests engaged in hunting, and a common object had brought them into collision.

S. rufo-nigra and *Œcophylla smaragdina*, Fabr.—In 1883 *smaragdina*, which had never for the previous ten years been a very common ant in Barrackpore, appeared in large numbers, and advanced from tree to tree along the trunk-road; it came up opposite the Club and the Park-gates, where the road turns round to the parade-ground and Pulta. I watched the position of affairs with much interest, as *smaragdina* had only the road to cross,—one big tree and one telegraph-post,—and they would be on to my favourite nest of *rufo-nigra*. This was in March, but it was not until April that *smaragdina* crossed the road, and I observed the workers gathering in numbers about the end big tree and the telegraph-post, but my tree was still unmolested. On Sunday, April 29th, however, the fight commenced; *smaragdina* were clustering round the tree, and making futile efforts to ascend, for *rufo-nigra* mustered in strength in a ring round the base of the trunk, and successfully repelled every effort of *smaragdina* to effect a lodgment. Ant for ant *rufo-nigra* was far more than a match for *smaragdina*, and the *yellow* ants were routed by the *red and black*. There were (as far as I could see) no killed on either side, and when I left, after watching some hours, *rufo-nigra* was master of the situation, and *smaragdina* retiring to the big tree and telegraph-post.

The next Sunday, May 6th, I again visited the tree, and to my surprise a great change had taken place in

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the position of the two species. There were no yellow ants round the base of the tree, but *smaragdina* appeared in great numbers high up on the trunk on the north side, and were descending towards the *red and black* in the shape of a wedge, the base spreading almost across the north side of the trunk, then tapering off to a point, the apex being formed by a *single* ant supported by *two*, the *two* by a line of three or four, and so on. When I arrived this *spear-head* of ants was about two feet above the entrance of *Pseudomyrma's* nest (which was a little on the west side of the tree); it was not advancing, but almost stationary, the only movement being made by the few forming the apex: *rufo-nigra* clustered in numbers round the entrance to their nest, but did not attempt any counter move in force or combined effort; they contented themselves with light skirmishing with the point of the *smaragdina* formation, but here, though they tried many times, they could make no impression; *rufo-nigra* invariably engaged yellow ant No. 1, the apex; No. 1 instantly backed on Nos. 2 and 3 in the second line, which brought an enemy on either flank, which was too great odds, and *rufo-nigra* would have much difficulty in disengaging herself. This went on for some hours, till I had to leave. I never saw any killed, but the apex of the yellows was once or twice relieved from the rear: *rufo-nigra* was evidently much alarmed, crowding round the entrance to their nest with a restless unmeaning action and generally scared look.

I could never make out how *smaragdina* arrived at the upper part of my tree; either they must have ascended on the south-east side (which was not so much frequented), when *rufo-nigra* was not on the alert, or they must have gone up the telegraph-post and travelled along the wires, which just at one point touched a few of the leaves of my tree. The trees on the right and left of my tree did not touch.

On Sunday, May 13th, I again visited my tree, expecting to find *smaragdina* in possession, but the reverse was the case; there was not a single yellow ant on it, *rufo-nigra* being in sole charge, and the work of the colony going on as usual. What had happened in the meantime I had no means of telling, but I think

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smaragdina must have left the tree of their own accord, and were not driven off.*

On Sunday, May 20th, I again went to my tree, to find another invasion of *smaragdina*, and the wedge-shaped column of yellow ants advancing as on May 6th; this time *rufo-nigra* hardly offered any opposition, and there was a very apparent diminution in their numbers.

On Thursday, May 24th, *smaragdina* had again deserted the tree, and *rufo-nigra* was to the fore.

On Sunday, June 10th, another invasion: *smaragdina* all over the tree, some workers being close to the entrance to *rufo-nigra's* nest; very few of *rufo-nigra* workers about, and these all small-sized specimens; the *red and black* ants almost suppressed.

On Sunday, June 24th, *smaragdina* occupied the upper portion of the tree, *rufo-nigra* the lower, and had regained their nest.

On Sunday, July 22nd, I found *smaragdina* strongly in the ascendant: very few workers of *rufo-nigra* about.

After this date I left off taking *written* notes, but *smaragdina* gradually deserted my tree, and passed on to others; *rufo-nigra* was left in undisputed possession, but the colony was never so populous and prosperous again, and on my leaving India, in 1886, had not entirely recovered from these invasions of the yellow ants.

In the 'Entomologist's Monthly Magazine' for 1876, pp. 87, 88, I have very fully described a curious phase in the history of this ant, and the beautiful sand-wasp, *Ampulex compressus;* how, on the 1st June, 1876, on the trunk of an old peepul-tree (*Ficus religiosa*), on the road to Pultah and Barrackpore, I found a number of these wasps and ants engaged in a series of battles, or what really describes it more accurately, wrestling-matches, the wasps jerking the ants clear off the tree one after the other; there would be a little fencing and

* It is possible that as the spear-head formation of yellow ants advanced to a level with *rufo-nigra's* nest, the *red and black* ants may have retired; it would be impossible for *smaragdina* to follow them up, as their size would not permit them to enter the burrows. The yellow column may have then passed on, and *rufo-nigra*, issuing in a body, taken them in flank, and by this skilful manœuvre snatched a victory from defeat; but of course this is mere conjecture, though more unlikely things do happen in ant-life.

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dodging for a hold, especially when two ants at the same time faced a wasp, but *Ampulex* always succeeded in jerking them off the tree. The ants did not appear to be hurt, and I watched several reascend the tree and try another fall with their too-powerful opponents. This tree was always much frequented by both *Ampulex* and *Pseudomyrma*, but I have never seen any "tummasha," as the natives would call it, of this sort going on there, either before or since; but on May 20th, 1883, on a peepul-tree in Barrackpore Park, I observed a single specimen of *Ampulex* jerking ants off the trunk, mostly *rufo-nigras*, but in this case there was some apparent reason; both ants and wasps were attracted to the same spot by some sort of sticky secretion exuding from the bark, and ants and wasp consequently collided, with the result that the former were jerked off as described; only a few of the *rufo-nigras* offered any opposition or made any fight, and as before, none of the ants appeared to be much the worse for their falls.

Pseudomyrma carbonaria, Smith.

Sima carbonaria, Smith.

This species is not uncommon in Bengal, and forms its nests in trees, as with *rufo-nigra*. I have only found one or two nests, and these were not populous; my best one was situated in an india-rubber tree (*Ficus*), on the drive from Government House to the Outram Statue, Calcutta. I have only taken one specimen of the winged female. The sting of this ant is sharp and pungent, but not to be compared in power to *rufo-nigra*. There is a species of *Salticus* which mimics this ant, but it is very rare, and there is another spider which also frequents tree-trunks, and closely mimics a *Camponotus*.

Œcophylla smaragdina, Fabr.

This well-known ant is common in Bengal, and forms its nests in trees by drawing together the living leaves with a fine white web, as described in Jerdon's 'Madras Journal.' In 1883 immense numbers of this ant appeared in Barrackpore, advancing from tree to tree along the trunk-road from Calcutta, and they soon took up a strong position in the Park; some of the trees were

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covered with nests, which are very populous. I noticed that the various *nests* on any *one* tree appeared to form *one colony*, and to live on friendly terms, whereas the ants on a neighbouring tree would be inimical; this I proved by keeping a nest in my verandah for several weeks at a time, and trying a few simple experiments. I found that ants brought from any nest from the same tree as my captive nest were immediately recognised as friends, and received with evident signs of satisfaction; but specimens brought from nests from any other tree were immediately attacked, and unless rescued were killed in the most savage manner. The longest test was only three or four weeks, for by that time my captive ants always began to show signs of failing health, so that I never had the heart to keep them shut up for a longer period. I tried to keep them healthy by a daily supply of fresh leaves, and fed them with sugar, plantains, and other fruits; but they took most kindly to green *Geometra* larvæ taken from newly-made nests of *Eumenes conica*, which were generally handy in the verandah, but either captivity did not agree with them, or I failed in my mode of treatment, for after the third week my captives invariably became more or less feeble and sickly. The following are extracts from my diary:—

May 6th. Brought home with me (with considerable difficulty) a fine strong nest of *Œcophylla smaragdina*, and arranged a comfortable home for it in a large open box in my verandah, isolating it by standing the box on a tin pot resting on a large brick, the brick standing in a large earthenware saucer of water.

May 24th. Introduced four ants taken from another nest, but from the same tree; these were at once received with marked signs of pleasure, were caressed, and entered the nest with their friends as if perfectly at home.

May 27th. Introduced ten specimens taken from a different tree: these at once showed signs of alarm, and endeavoured to escape; but most of them were seized, and would have been pulled to pieces had I not rescued them.

June 3rd. Introduced some more strangers, who showed alarm and immediately made off till stopped by the water; the captive *smaragdina*, though showing

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signs of hostility, were too feeble to make any serious attack.

I repeated this experiment many times, varying the intervals of introducing friends and strangers from a few days up to the three weeks, but always with the same result. I then altered the conditions somewhat, and on June 10th cut a fine populous nest from a tree and placed it on the trunk of one a few hundred yards distant, inhabited by another colony. The ants from my nest immediately took possession of the fork where I had placed the nest, overpowering the few ants that happened to be about; but others came streaming down to repel the invaders. My nest continued to pour forth its swarms, and soon the trunk was covered with masses of struggling yellow ants. It was, as far as I could judge, a drawn battle.

I then withdrew my nest, and hung it up to the trunk of a tree frequented by *Pseudomyrma rufo-nigra*. Out sallied the yellow ants, and *rufo-nigra* in alarm made off, and in doing so showed a great amount of discretion; they had not the numbers to make a stand-up fight, but their superior individual strength enabled the few that were attacked to deal out some rapid and effective strokes with mandibles and sting, to wrench themselves clear and escape without injury. I then took the nest of *smaragdina* back to the tree from which I cut it, and the ants were at once received with every sign of pleasure; and, although hundreds must have been left behind on the two trees, the nest appeared to be as populous as ever.

On another occasion I hung a nest of *smaragdina* to a small Palmyra palm in my compound, which was occupied by a strong nest of the yellow wasp, *Polistes hebræus*, but the ants and wasps did not come into contact in any way, although they were only separated about two feet. In this my observations did not agree with the late Mr. Chas. Horne's, who found that *Œcophylla* had a great antipathy to *Polistes*; and in his paper on Hymenoptera from the North-west Provinces gives a very interesting account of the attacks of the yellow ant on the yellow wasp; but in my case the ants were not quite under natural conditions, which may easily account for their leaving the wasps alone. And I was never able to find *Œcophylla* and *Polistes* inhabiting

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the same tree; but I think the observation is of interest as tending to show that ants under slightly altered conditions will often show different traits of character or instinct.

During the time I kept *Œcophylla* in confinement I found they were very stupid in any efforts they made at escape; they would occasionally tumble off the brick island into the water, although within an inch would be a bridge purposely arranged for their use. When *Œcophylla* did fall in the water they collapsed and drowned at once, and seemed incapable of making any attempt to save themselves by swimming an inch or two. Some nests I kept in a large open tin-lined box, which held them securely until the tin lost its smooth surface from exposure, and allowed the ants a foot-hold, but even then they were very slow to escape.

Diacamma vagans, Sm.

This species is very common in Bengal. You never find it in large numbers, but generally singly, or two or three together; its nests, which are never populous, are usually formed under bricks, stones, or in brick-work, and always in shady situations. It appears to have no regular time for swarming; its sting is sharp, but the pain does not last more than a few seconds.

In the verandah of my bungalow at Barrackpore I had a nice little nest in the brick-work, which I watched for several years, and used to feed the workers with sugar and other sweets. I arranged a little island by means of a brick placed in the centre of a large plate filled with water, covered the brick with sugar, and then with a piece of bamboo made a bridge from the floor to the brick. I left this the whole of one Sunday, but no ants found out the treasure. The following Sunday I captured a *vagans*, marked her with paint, and put her to the sugar; she immediately seized a grain, crossed the bridge, and made off home to her nest, distant about 35 ft., in a fairly direct line. After depositing the sugar she was out again in a few seconds, made her way back to the island, took another grain of sugar (she usually selected the largest), then back to the nest. I watched about a dozen journeys, and after the first two her track was as near a straight line to the sugar as could be. A

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few workers came out from her nest and stood about the entrance, but she took no notice of them. I do not know how many journeys she made that day, as I had to leave for the evening drive.

The next Sunday I arranged the sugar island in the same place. There were a good many ants of different species walking about, but none found the way to the sugar. In about an hour out came my marked ant, and after a little wandering about found the bridge, and then followed the rapid journeys to and fro with the sugar. She never appeared to eat any herself, her great desire being to get all she could stored in her nest.

The next Sunday the same process went on, but with this slight difference: this time some of her own fellow-workers seemed inclined to follow her and watch her movements, and my marked ant, after going one or two direct journeys, then altered her mode of travelling to a very irregular and zigzag course, and generally assumed a casual and uncertain air. I watched her closely, and am quite certain she wished to bamboozle her friends, and keep all the credit and "kudos" of bringing home the treasure to herself. She kept up these roundabout journeys to and from the island until I left for the usual drive.

I carried on these experiments for many successive Sundays, but no other ants from this nest found out the island. A small species of *Tapinoma* did, and came in numbers every Sunday, and at last a worker of *vagans* from another nest at the other end of my verandah, distant about 50 ft., found out the bridge, I think by accident, but had the enterprise to cross, seize a piece of sugar, and off to her nest. After this I always had a marked ant going backwards and forwards with sugar on the left side, and an unmarked ant doing the same on the right side, and little *Tapinoma* swarming all over the place with the grains, but no other ants found out the sugar island. Sometimes the two workers of *vagans* met on the brick or bridge, but never took any notice of each other; they were too much wrapt up in their work for that.

I should mention that I always arranged my island within a few feet of the same spot, and now I often wonder why I never changed the position completely, and then watched the result.

After reading Sir John Lubbock's most charming

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work on ants, I thought I would try a few simple experiments to see if I could influence my ants by means of colours. I first scattered sugar about my verandah for a day or two, by which means I attracted considerable numbers of ants of different genera and species, particularly *Diacamma*, *Solenopsis*, and *Tapinoma*. I then placed sugar on different coloured cards (subsequently substituting the intensely brilliant colours of surface-papers for the cards), making various changes from time to time according to my judgment. These experiments I kept up for a good many weeks, but I could never find that colour influenced my ants in any way. I do not attach any value to this, as my experiments were very crude, and generally interrupted by the gaps of from Sunday to Sunday, and I only mention the circumstance as affording some traits of ant-character. *Tapinoma* was always first at the sugar, and swarmed indiscriminately over anything alike.

Diacamma vagans was fairly quick at the sugar, but appeared to be influenced chiefly by the card nearest her nest, and perhaps in some degree by the one with the finest grains.

Solenopsis gemminatus seemed only to blunder on the cards by accident, and without, as far as I could observe, any particular signs of intelligence. *Tapinoma* ate sugar on this spot, and also carried off grains. *Diacamma* carried off the sugar as fast as possible, but ate none. *Solenopsis* ate sugar on the spot, but did not carry any away.

By alarming the ants by striking the cards, shaking the paper, or dropping fine powdered sugar on them, *Diacamma vagans* and *Tapinoma* would give a little start, but, recovering themselves instantly, would seize the nearest and biggest grain, and make off at express speed. *Solenopsis* would start, sometimes tumble over one another, and then make off in alarm and without any method or precision. According to my ideas, *Diacamma*, by a number of little traits which I cannot describe, but which as a whole made a great impression on me, showed the most intelligence, *Tapinoma* the most audacity. *Solenopsis* I do not like to judge rashly from an imperfect human point of view, so will only say I was disappointed with them generally. I never succeeded

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in frightening my ants by noise alone; noise had always to be accompanied by an earth tremor or wind.

I several times endeavoured to keep workers of *vagans* in captivity, but never with any success; they swarmed up the sides of my highly polished tin-box with ease, and in my island arrangement, which kept *smaragdina* in perfect security, they found their way with wonderful rapidity to the brick surrounded by the moat, and then took to the water without a moment's hesitation, and with one or two strokes with their legs they got over the two or three inches of water with almost the ease and dexterity of a water-boatman.

On one occasion I put two workers in with *smaragdina*. One escaped at once; the other was seized, but fought her way clear, and followed her companion with splendid determination and quickness. It would require much ingenuity to make a receptacle that would safely and conveniently confine this clever ant.

In Barrackpore Park, on the river-drive half-way between "Scandal-point" and Tittaghur Bridge, at one of the prettiest spots in the most beautiful park in Bengal,—I might almost say in India,—is a fine old banyan-tree (*Ficus indica*), with foliage almost touching the ground; it stands on the green slope below the drive, and the breeze, blowing straight up from the broad Tittaghur Reach, makes the shade of this tree delightfully cool in even the heat of May or June. There is in this spot a stone culvert running under the road, the mouth of it opening in the deepest shade of the tree, and on the stones of this culvert you can find almost all the year round, but particularly in the hot weather and rains, numbers of the workers of *Diacamma vagans* congregated together in couples, and engaged in what I take to be a process of shampooing. Two ants will face each other, and fence about and caress with their antennæ, now advancing, now retiring a little; at last one will give a little spring on to the back of the other, and gently and tenderly hold her with her mandibles; then the caressing with the antennæ is renewed, and the legs are also brought into play, and used in much the same way; and lastly, the mandibles will be run gently up and down the limbs. During this operation the ant under treatment will keep time with her antennæ, and stretch out her limbs with evident

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delight and pleasure: there can be no doubt they thoroughly enjoy themselves. You may watch couples in various stages of this process, which is varied at times by three ants taking part, or by one affecting a kind of coy resistance.

I have mentioned that, although *vagans* is a common ant, you cannot find it in large numbers; neither can you start out from your bungalow collecting with an absolute certainty of finding it; but for *ten years* a visit to this culvert under the shade of this banyan-tree on the river-bank always rewarded you with an interesting group of playing, caressing, shampooing ants. During these ten years I only twice found nests of this species within the radius of this banyan's shade or its immediate vicinity, so that, as a rule, my ants must have travelled some distance in order to enjoy and disport themselves in this delightful retreat.*

I must leave my favourite *vagans* now, for I have no more *written* notes, but from numbers of unrecorded observations extending over the years from March, 1872, to March, 1886, I always look back on this species with much affection, and as an old friend who, under any circumstances and tests, has never disappointed me. Judged from a human point of view (which, however, may not be always strictly fair), I certainly place *D. vagans* as the most intelligent ant it has been my pleasure to observe, and I consider *Chlorion lobatum* the most intelligent amongst sand-wasps.

Solenopsis gemminatus, Fabr.

Solenopsis geminata, Fabr.

This species is one of the very commonest in Bengal; you can come across it everywhere. It is the *red ant* of India, as *compressus* is the *black*, and *smaragdina* the *yellow*. It forms its nests, which are very populous, in the ground, under bricks or stones in brickwork, or almost anywhere. It appears to swarm several times in the year from March to October, and I have even

* I could never find out if the ants that frequented this culvert at any one time were all from the same nest, but I am inclined to think, from their numbers and the smallness of the colonies of *vagans*, that sometimes they were not. I have observed this shampooing going on in other similar situations, but never with the regularity and certainty of this favoured spot.

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found the winged sexes in the cold weather from November to February. The workers vary greatly in size, some of the workers-major having immensely-developed heads, but you seldom meet these big fellows walking about; they seem to keep to the nest a good deal, and all my finest specimens have been found by opening up a nest. These ants are very fond of forming covered ways from one point of a colony to another, or in crossing a road, and they both tunnel and build up and are very clever in availing themselves of any little irregularities in the ground, by which they can save themselves labour. For instance, on a piece of smooth even ground they will build up a covered way, but if their track comes across a stone they will tunnel under it; if a big brick they will skirt the side of it. They do not completely cover in their ways along the whole line; a great part of the track will generally consist of two walls only. The medium-sized workers, as well as the small, take part in these works, but the giant-headed fellows I have never found engaged.

These ants will come into your bungalows and clear off any loot that may be about, and they seem particularly fond of meat, or any insect you may kill. Supposing you have a flight of cockroaches (*B. orientalis*) come into your room at dinner-time, and in self-defence and to preserve say your soup or glass from being used as a bath you kill one or two, and leave the bodies on the ground, in a very short time, long before you have finished your meal, you will see their bodies apparently become endued with a new life, and travelling at a quite rapid pace across the floor; it is swarms of the little workers of *Solenopsis* carrying off the body to their nest.

In one bungalow at Barrackpore I had a colony in my verandah formed in one of the masonry columns, and divided into two parts, one in the base and one in the capital, and up and down the column between was a continual stream of ants passing. It occurred to me one day to cut off this passage, which I did by soaking a punkah-cord in kerosine oil, and tying it tightly round the centre of the column. The ants on either side soon surged up in masses to within an inch of the cord, but none could cross the oily barrier. I then formed a little bridge with a piece of bamboo, and fixed it in the brick-work, making a clear span over the cord, and the

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ends being fixed well in the crowd of ants. I then watched for an hour, but no ants found their way across. I then conducted two or three over, and waited an hour; one of the led ants recrossed, but no others availed themselves of the bridge. I then went for the usual evening drive, and on my return after a couple of hours I found the ants crossing the bridge in numbers. I repeated this experiment many times with exactly the same result. Say barrier fixed at 3 p.m.; bridge erected at 4 p.m., and a few ants led over; at 6 p.m. no ants had availed themselves of the bridge, but at 8 p.m., on my return from my drive or tennis, the bridge would be in general use; but never while looking on did the ants avail themselves of this passage, except as mentioned by a led ant recrossing.

On one or two occasions I captured a worker of *Diacamma vagans*, and placed her above the kerosine cord; without a moment's hesitation she ran up the column to the capital, made her way rapidly through the red ants, then along a beam to the next column, then down to the floor of the verandah, and off to her nest without a pause.

Solenopsis offer many strange contrasts of character; they are very clever in making their covered ways, and in finding their own booty, such as described, but when you apply artificial tests of intelligence they altogether fail, and seem to be strangely slow and disappointing.

Holcomyrmex indicus, Mayr.

This ant does not appear to be generally common in Bengal. I have taken it at Nischindipore Nuddea, and in Barrackpore Park, but never in Calcutta or its immediate neighbourhood. It is very plentiful in Barrackpore Park, in the private grounds close to Government House, where it delights in making its nests in the red kunka (ballast) roads, or on any hard dry patch of ground that can be found amongst the grass. The ants swarm early in June, and during the hot months from middle of March to the middle of June you can easily find the nests by the great mounds heaped up round the entrance of empty seed-vessels or husks of grass-seed, I may call it chaff; these mounds will more than fill a pint measure, and I have seen some

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which I think would fill a quart. If you watch you will see a continuous but straggling stream of ants disappearing down one of the small round entrances to their nests, each carrying a grass-seed, which they bring from the neighbouring grass, and another stream will be seen emerging with the chaff, which they heap up round the entrance in irregular mounds: when these mounds begin to assume any dimensions the labour of piling up the husks is divided; the ant that brings one out will throw it down just outside, or will mount a short distance up the mound, when another will meet and take on the husk and add it to the top, or when the mound is a certain height, will shoot it down on the far side to prevent its tumbling back on the entrance of the nest. Sometimes three or four ants will be engaged in this process, bringing out, passing on, piling up, and shooting down. The ants bringing in the full seeds collect them amongst the grass, which at this time of the year is dry and ripe, and consequently much of the seed is on the ground. I have never observed them ascending the grass-stems to collect the seed. As soon as the *rains* commence—about June 15th—the ants seem to disappear, and although you can find specimens about up to October, they are decidedly scarce.

I have tried very many times to unearth one of these nests, but never (except in one instance) with any success. Directly you dig down a few inches in the hard bricky soil you seem to lose all trace of ants and nest. I have tried various instruments—a garden-knife, a long bodkin, and a kourpi (a very handy native tool)—but have always failed; the way the ants disappear is almost like magic. No doubt I ought to have tried a kodali (native spade), but extensive excavations where these ants formed their nests were hardly practicable without obtaining the permission of the Park authorities, which I never took the trouble to do at the time, though now I have left India I never cease to regret that I did not dig down several feet deep and a yard or two square.

The one exception I have alluded to was a very small nest, situated in the viceregal kitchen-garden part of the Park, and where the soil was a sort of stiff clay instead of brick-rubble; the tunnels were very small and fine, and there was nothing peculiar about their formation, but in the centre, a few inches from the

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surface, was a small oval chamber, perfectly smooth and dome-shaped; in this were arranged a number of little round seeds, set out like cheese-cakes on a baker's tray. From the habits of this species I should be inclined to call it the "harvesting ant of Bengal." It was described by Dr. Mayr from my first specimens, which were taken at Nischindipore, having been kindly forwarded by my old friend the late Mr. Frederick Smith.

Pheidologeton laboriosus, Smith.

This species can generally be found in the neighbourhood of Calcutta or Barrackpore, but it requires a little searching, and I do not think it would attract the notice of any one but an entomologist. The workers vary most immensely in size, the workers-major running through several distinct grades, and no one who had not observed the nest itself could suspect any connection between the noble, handsome, rich red-brown giants of the first grade with the little insignificant yellow workers-minor. These ants form their nests under bricks, stones, flower-pots, rock-work, or any spot offering shelter and shade of this nature. You occasionally meet with them on the march, probably changing their head-quarters, and when doing so they invariably form elaborate and carefully constructed covered ways. The little yellow workers-minor and the smaller grades of the workers-major you may meet with in the open, but the giant workers I have never found except by opening up a nest or covered way. All the workers are pugnacious, and when handled attack you freely, and the small yellow workers and the smaller grades of the workers-major with some effect, but the giants are perfectly harmless, and it makes one feel quite sorry to watch these huge, brave, conscientious, handsome fellows doing their very utmost to grip you with their mandibles, and doubling in their body, as if with the intention to sting, but with absolutely no result.

In forming their covered ways the workers-minor and the smaller grades of workers-major work together most industriously, carrying and piling up the little pieces of soil with great quickness and dexterity, but I have never observed the giants of the first grade so engaged; they, I think, have a special work to perform, which I will describe.

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On the river-drive in Barrackpore Park between Scandal Point and Titaghur Bridge, and close to the latter, I found, in the first week of the "rains" in 1883, a splendid covered way in course of construction across the road, which at this point is about 20 ft. wide. There were a large number of ants at work piling up the little red pieces of soorki (ballast; the soil anywhere about Calcutta or Barrackpore seems to be largely composed of brick and ballast)—and I noticed several of the giant workers also very busy, *not* carrying or building up, but slowly making their way along the line, and here and there stopping and rearing themselves up against the walls, pressing together, and smoothing out in a way which their great size gave them special facility for doing. They used themselves much in the same way as I have seen my mali smooth over the earth with a board when doing a little gardening with belatee (Europe) seeds, or as some of the local rajmistris will also use a board in building a wall. I visited this covered way on a good many successive days, and always found the *giants* busy in this work; they would stand on their hind legs, spread themselves out, and bind together with an even kind of pressure the little blocks or grains of building material. If you picked one up she immediately attacked you in the same thorough, loyal, but perfectly impotent, manner, and when you replaced her she resumed her consolidating form of work. I had (until finding this covered way) often wondered what special use these big fellows served, but I now feel certain this battening process is one. This covered way was cut to pieces and destroyed by the carriages driving up and down every evening, and as regularly repaired by the ants in the early morning. This went on for several weeks, when the ants seemed to pass on, and I lost sight of them. The workers, in traversing their covered way, carried about with them quite an assortment of odds and ends, amongst which I have noticed the larvæ of a Rhyparochromid bug in considerable numbers, sundry other larvæ unknown, a species of weevil, small shells (*Bulimus*) in some numbers, bits of stick or twigs, seeds, head of an ant, &c.

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Dorylus (*longicornis ?*).

Before leaving for India, in 1872, my kind old friend Mr. Frederick Smith gave me specimens of the workers and male of *Dorylus*, and thoroughly imbued me with the necessity of discovering the female, and I started for the East with the most perfect confidence of doing so. On my way across from Bombay to Calcutta I stopped at Jubbulpore to visit the Marble Rocks, and while at dinner at the hotel a male flew in to the light; this was my first introduction to this ant, March 6th, 1872.

I had not been long in Calcutta before I found a very promising-looking nest under a large stone at the bottom of an empty tank on the Alipore side of Fort William. I visited this nest two or three evenings a week for some months, feeling certain that some evening my persistence would be rewarded by finding the ants swarming and capturing the female; but I was doomed to disappointment, for on going to the tank one evening I found the water had been let in, and it was being filled for military purposes. I next took the workers in some considerable number in a purchase of pot-plants made at an auction sale at Mackenzie Lyalls; but my next real nest was at Scandal Point, Barrackpore Park, in the earth, and sheltered by one of the wooden seats which are erected there. I examined it very carefully, probing the burrow with a straw, but, though the workers sallied out in some numbers, there was no sign of a female. I was uncertain whether to dig the nest up then and there, or to watch it for some indication of swarming before disturbing the ants. I unfortunately decided on the latter course, for when I went to the spot the next evening there was not an ant to be seen.

My next nest was found in a small brick culvert leading from the old bear-pit, Barrackpore Park, and was formed under a lot of rubbish made up of bits of brick and decayed leaves. This was a fairly populous little colony, and looked a very likely find, and I visited it for several weeks, until one of the Park malis (gardeners), seized with an extraordinary fit of industry, took it into his head to clear out and tidy up this old drain, which had not been disturbed for years. After this I did not find what might be considered a genuine nest until 1886, but stray lots of the workers could often

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be found about the Park, particularly at the back of the lions' and tigers' cages, where the old bones were thrown, and which you could generally count on finding covered with the workers; indeed, an old bone or piece of meat seemed to be an irresistible bait to the workers of *Dorylus*.

The males are never found with the workers, but come into your bungalow at night, attracted by the light, generally at dinner-time, when the lamps being turned up the white cloth forms a special attraction; they come buzzing in and blunder about the room much like a *Scarabæus* beetle, and when handled they work vigorously about with their bodies and clip you with the strong claspers of their genital armature. They are by no means uncommon, but what is very curious is that they usually appear at the end of the cold weather or the commencement of the hot, that is, from middle of February to middle of March, when winged ants of other genera can hardly be found.

My last nest of *Dorylus* was found on the Esplanade, Bombay, on January 29th, 1886; it was my last visit to India, and I was starting for an evening walk, when not a hundred yards from the clock-tower of the University I noticed a strong body of the workers very busy round the entrance to a burrow just at the edge of the turf, and a second glance showed me they had some object in this burrow that they were particularly anxious and jealous about, and, stooping down, I pulled out what from the colouring of the head, legs, and antennæ (so exactly like the workers of *Dorylus*), if I did not actually believe, I at least fondly hoped was the *female*, which I had been looking for for so many years. I rushed back to the Esplanade Hotel, got my collecting-bottle and a knife, returned to the spot, and this time dug up the nest without waiting. I found two more of these suspicious-looking insects, and from the curious, fussy, jealous, and at the same time half-respectful, behaviour of the workers, my hopes as to the genuineness of my find considerably rose. I got three nice little bottles filled with rum, and by the next mail sent them off to Professor Westwood and Mr. Edward Saunders, who kindly wrote me by return of post that my capture was only the "*larva of some Lamellicorn beetle.*" What *Dorylus* does with these larvæ I should much like to know; but my fondest hopes were dashed to the ground,

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and after fourteen years of careful search I left India, I fear for good, without finding the *female* of *Dorylus*.

Lobopelta diminuta, Smith.

This ant is common enough in Bengal, but I have never found any nest; it is always on the march, and moves in lines two deep, and from a few feet to many yards long. The longest column I have met with was in the Botanical Gardens, Calcutta, and measured a little over thirty yards. It marches at a great pace, and seems to prefer shady and damp situations; a number of the workers will always be seen carrying their pupæ with them, which they do by holding them under their bodies, and walking as it were over them.

Lobopelta chinensis, Mayr.

A common ant in Bengal, but only found in small numbers at a time, sometimes only single specimens, and generally crawling about drains or damp shady ground.

Meranoplus bicolor, Smith.

This pretty little species is common in Bengal, although you only find it sparingly as to numbers; it forms its nests in the earth at a depth of a few inches, and these seldom contain more than twenty to thirty individuals. I have only once found the winged sexes in the nest, *viz.*, in May, 1873, in the Eden Gardens, Calcutta, when I took one female and several males (as described and figured in Frederick Smith's paper in the 'Entomological Transactions' of March, 1865). I have since taken one or two specimens of the female, but always singly. The workers walk about singly or a few together, and very much resemble, both in appearance and habits, the females of some of the small species of *Mutilla*; indeed, I have at times captured a worker of rather above the average size, thinking I had something new in that genus.

Plagiolepis gracilipes, Smith.

Query also *Hypoclinea gracilipes*, Mayr.

This ant is common in Bengal, and can generally be found running about between the stems of the smaller

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species of bamboo, or behind jaffri (trellis-work), and similar shady situations. The workers are very active, and always seem busy carrying about various species of insects. I have some specimens before me taken with a species of *Pediopsis* (Homopteron) and *Nysius* (Hemipteron), which appear to form a very favourite form of capture.

Aphænogaster.

There are two species of this ant, which are not uncommon in Barrackpore Park in the hot weather; they form their nests in the dried-up grass-covered ground of the open and most exposed positions. One species covers the entrances to its nest with the fallen leaves of the tamarind, acacia, and a thorny shrub like the babool. The other makes tiny mounds of the little pink and blue flowers of a weed that grows amongst the grass; these little mounds, about the diameter of a rupee, and perhaps from one-eighth to one-fourth inch high, are very pretty objects, and from their bright colour easily catch the eye.

Cremastogaster Rothneyi, Mayr.

This pretty little species, which was described from specimens taken in the Eden Gardens, Calcutta, also occurs in Barrackpore Park, but does not appear to be generally common in Bengal; it frequents the trunks of trees, but I never succeeded in finding the nest.

The Mushroom Ant.

There is a species, one of the *Poneridæ*, the males of which come in numbers to light, and settle on the white cloth at dinner-time, or fly about the lamps; it is common from the beginning of the hot weather in March to the beginning of the cold season in November, but I have never been able to find either the workers or females to which it belongs,—that is, *knowingly*. From the very strong smell which it has when handled, and which exactly resembles mushrooms, I have given it the above MS. name.

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XIV. *Synonymic notes on the moths of the earlier genera of Noctuites.* By Arthur G. Butler, F.L.S., F.Z.S.

[Read June 5th, 1889.]

During a recent re-arrangement of the genera *Agrotis*, *Mamestra*, and allies, I have discovered a considerable number of synonyms, which I now propose to record. In my re-arrangement I have in the main followed the classification employed in A. R. Grote's 'Check List of North American Moths' of 1882, as being on the whole more natural than that of Lederer (adopted by Staudinger and Wocke); at the same time I have, to a certain extent, broken up the very heterogeneous group *Agrotis*, and, on the other hand, have amalgamated the homogeneous material separated under the names *Mamestra*, *Apamea*, *Hadena*, &c. In some instances, as in the case of *Triphæna*, I have adopted the generic name rather as representing a well-marked and easily recognised group than because it actually possesses any strictly generic value; but, as a rule, I have endeavoured to use only such names as appear to represent groups differing structurally from their nearest allies, though occasionally the structural distinctions are slight, and such as might be considered by some lepidopterists insufficient. It should, I think, always be borne in mind that the object of genera is to simplify as much as possible the study of nature, and therefore, that in the arrangement of such unwieldly genera as *Agrotis*, any single structural character ought to be considered sufficient, if it enables the student to break them up into groups of more manageable dimensions.

Agrotis, *Ochs.*

I have restricted this genus to species the males of which have either pectinated or serrated antennæ, the serrations terminating in short cilia-like pencils. The type of the genus is *A. segetis*.

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Synonyms to Agrotis.

1. *Agrotis segetis*, Gmel.

Agrotis marginalis, Walker, Lep. Het., x., p. 339, n. 77 (1856).
A. obliviosa, Walker, *l. c.*, p. 340, n. 78.
A. dividens, Walker, *l. c.*, p. 342, n. 86.
A. aversa, Walker, *l. c.*, p. 345, n. 92.
A. correcta, Walker, *l. c.*, n. 93.
A. repulsa, Walker, Suppl., 2, p. 696 (1865).
A. conspurcata, Walker, *l. c.*
A. certificata, Walker, *l. c.*, p. 697.

Of the above synonyms, *A. marginalis*, *obliviosa*, and *dividens* are from South Africa; *A. aversa*, *correcta*, and *repulsa* from India; *A. conspurcata* from Ceylon; and *A. certificata* from Shanghai. Mr. Walker has selected chiefly the dark female specimens of the species for description; *A. dividens*, however, is a dwarfed pale female with pinched-in abdomen and male colouring; it is described as a male.

2. *Agrotis biconica*.

Agrotis biconica, Kollar in Hügel's Kaschmir, iv., p. 480 (1842—44).
A. exigua, Kollar, *l. c.*, p. 481.
A. spiculifera, Guenée, Noct., i., p. 266, n. 425 (1852).
A. aristifera, Guenée, *l. c.*, n. 426.

A common and widely distributed Indian form, intermediate between *A. segetis* and *A. munda*. *A. exigua* is a name given to a starved specimen.

3. *Agrotis munda*.

Agrotis munda, Walker, Lep. Het., x., p. 348, n. 99 (1856).
A. basinotata, Walker, *l. c.*, xv., p. 1686 (1858).
A. aneituma, Walker, Suppl., 2, p. 701 (1865).
A. turbulenta, Walker, *l. c.*, 2, p. 703.
A. injuncta, Walker, *l. c.*

A common Australian species, easily distinguished from *A. segetis* and *biconica* by the blackish apical patch on under surface of secondaries.

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4. *Agrotis interjectionis.*

♀ *Agrotis interjectionis*, Guenée, Noct., i., p. 281, n. 454 (1852).

♀ *A. orbicularis*, Walker, Lep. Het., Suppl., 2, p. 700 (1865).

♂ *A. significans*, Walker, *l. c.*

Java.

5. *Agrotis corticea*, Schiff.

Agrotis fraterna, Moore, Descr. Ind. Lep. Atk., ii., p. 116 (1882).

The Indian specimens differ in no respect from specimens in the Zeller series taken in Europe.

6. *Agrotis ignobilis.*

Mamestra ignobilis, Walker, Lep. Het., ix., p. 239, n. 39 (1856).

Agrotis rubrilinea, Walker, *l. c.*, x., p. 351, n. 105 (1856).

A. recondita, Walker, *l. c.*, n. 106.

A. dorsicinis, Walker, *l. c.*, xv., p. 1701 (1858).

A slightly variable Australian species.

7. *Agrotis subgothica*, Haw.

Feltia ducens, Walker, Lep. Het., ix., p. 203, n. 1 (1856).

An example from Orilla.

8. *Agrotis jaculifera*, Guén.

The *A. tricosa* of Lintner is typical *A. jaculifera*, and *A. herilis* appears to me to be a very slight variety only distinguishable by its greyer coloration and the grey instead of dull whitish "orbicular" spot of primaries; at the same time, as we have a good series of the latter, and its specific identity with *A. jaculifera* is unproved, I have retained it as a distinct species in the collection.

Owing to the difficulty of collating the many scattered references to the descriptions of North American species, and the time which would be occupied in so doing, I cannot attempt here to look them up; a mere quotation

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of the synonyms will be enough for those who make a special study of the N. American fauna.

9. *Agrotis vancouverensis*, Grote.

The *A. semiclarata* of the same author appears to me to be the female of *A. vancouverensis*.

10. *Agrotis venerabilis.*

Agrotis venerabilis, Walker, Lep. Het., x., p. 328, n. 49 (1856).
A. incallida, Walker, *l. c.*, p. 330, n. 52.

A fairly common N. American species, near to *A. volubilis* of Harris.

11. *Agrotis annexa*, Treit.

Agrotis anteposita, Guenée, Noct., i., p. 278, n. 449 (1852).
A. decernens, Walker, Lep. Het., x., p. 333, n. 60 (1856).

A very common New World species.

12. *Agrotis bipars.*

♀ *Agrotis bipars*, Walker, Lep. Het., x., p. 334, n. 62 (1856).
♂ ♀ *A. consueta*, Walker, *l. c.*, n. 63.

The types were all taken by Dyson in Venezuela.

13. *Agrotis bilitura.*

Agrotis bilitura, Guenée, Noct., i., p. 285, n. 467 (1852).
A. deprivata, Walker, Lep. Het., xi., p. 739 (1857).

A Chilian species, the males of which have the serration of the antennæ less pronounced than in any of this group of New World forms.

14. *Agrotis hostilis.*

Agrotis hostilis, Walker, Lep. Het., xi., p. 737 (1857).
A. consueta, Walker, *l. c.*, p. 738.
Graphiphora sobria, Walker, *l. c.*, p. 744.

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Agrotis incommoda, Walker, *l. c.*, Suppl., 2, p. 692 (1865).

The types are from New Grenada and Venezuela.

15. *Agrotis spissa.*

Agrotis spissa, Guenée, Noct., i., p. 261, n. 415 (1852).

An example of this species in the Grote collection is labelled as *A. cochranii* of Riley; the latter, however, though nearly allied to *A. spissa*, is possibly distinct; it is much darker.

16. *Agrotis admirationis.*

Agrotis admirationis, Guenée, Ent. Month. Mag., v., p. 38 (1868).

? *Chersotis inconspicua*, Butler, Cist. Ent., ii., p. 545, n. 14 (1880).

Var. *Chersotis sericea*, Butler, *l. c.*, p. 490, n. 9 (1879).

New Zealand.

If our examples of *A. admirationis* are rightly identified I think the above must be considered synonyms; *A. sericea* is the more distinct form, the markings of the primaries being almost wholly absent, but it may well be a variety.

17. *Agrotis moderata.*

Agrotis ? moderata, Walker, Lep. Het., Suppl., 2, p. 705 (1865).

Spælotis inconstans, Butler, Cist. Ent., ii., p. 545 (1880).

New Zealand.

We now possess nine examples of this species, and I find it impossible to separate the above, which varies not a little.

18. *Agrotis insignata.*

Agrotis insignata, Walker, Lep. Het., x., p. 330, n. 53 (1856).

A. tritici (part), Guenée, Noct., i., p. 288, n. 471 (1852).

Mamestra declarata, Walker, Lep. Het., Suppl., 2, p. 663 (1865).

Agrotis campestris, Grote (*vide* Check List, p. 25, n. 215).

A common N. American species allied to *A. tritici.*

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19. *Agrotis divergens.*

Agrotis divergens, Walker, Lep. Het., x., p. 327, n. 46 (1856).

Agrotis versipellis of Grote is indistinguishable from this species.

20. *Agrotis spina.*

Agrotis spina, Guenée, Noct., i., p. 269, n. 433 (1856).
A. capularis, Guenée, *l. c.*, p. 271, n. 437.
Mamestra tenebrosa, Walker, Lep. Het., Suppl., 2, p. 669 (1865).

A common Australian species.

The genus *Pachnobia* appears to me to be a mere group of *Agrotis;* I restrict it to *P. carnea, rubricosa, imperita, geniculata,* and *salicarum.*

PERIDROMA, *Hübn.*

Differs from *Agrotis* in the finely ciliated (neither pectinated nor serrated) antennæ of the males. Type, *P. saucia* (*ypsilon*, Rott.).

Peridroma ypsilon, Rott.

Noctua saucia, Hübner, Samml. Europ. Schmett., fig. 378.
Agrotis differens, Walker, Lep. Het., x., p. 336, n. 67 (1856).
A. ambrosioides (Morrison), Walker, Lep. Het., xi., p. 738 (1857).
Var. *Spælotis stictica*, Blanchard, in Gay's 'Fauna Chilena,' vii., p. 73, n. 1; pl. 6, fig. 8 (1854).
Var. *Agrotis impacta*, Walker, Lep. Het., x., p. 337, n. 71 (1856).
A. intecta, Walker, *l. c.*, p. 338, n. 72.

An example in the Grote collection corresponding with the variety *A. impacta* is labelled "*Agrotis turris*"; the variety *A. stictica* is the most extreme variegated form of the species.

TIRACOLA, *Moore.*

A strong-bodied Sphingiform genus, the males of which have simple antennæ.

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Tiracola plagiata.

Agrotis plagiata, Walker, Lep. Het., xi., p. 740 (1857).
A. plagifera, Walker, *l. c.*, p. 741.
Var. *Agrotis spectabilis*, Walker, *l. c.*, Suppl., 2, p. 704 (1865).

Java, Borneo, Ceylon, Canara, Darjiling, and Moreton Bay.

The Canara specimens are labelled "*sphingiformis*," apparently a MS. name proposed by Adam White; the variety from Moreton Bay is simply a dark-coloured example. Mr. Druce has the same variety from Mexico and Rio Janeiro.

The genus *Spælotis* (type *S. ravida*) consists of a few oblong-winged species, the males of which have simple antennæ; I think it doubtful whether this group should be kept separate from the *Noctua* of authors, which it greatly resembles.

SPÆLOTIS, *Boisd.*

Spælotis ravida, Schiff.

Noctua clandestina, Harris, Ins. inj. veg., 3rd ed., p. 448 (1862); 1st ed. (1841).
Mamestra unicolor, Walker, Lep. Het., ix., p. 233 (1856).
Graphiphora valida, Walker, *l. c.*, Suppl., 3, p. 711 (1865).
G. caliginea, Butler, Ann. Nat. Hist., 5, vol. i., p. 165 (1878).

A somewhat variable common and widely-distributed species; the European examples are, as a rule, smaller than those from other parts of the world. In the Grote collection I found a female of this species labelled as "*A. pastoralis*, Grote."

Most of the species hitherto placed in *Spælotis* will have to be removed to *Chera*.

CHERA, *Hübn.*

Chera birivia, Hüb.

I cannot distinguish the *Agrotis dolis* of Grote from this species.

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Graphiphora, *Ochs.*

This genus, of which *G. augur* is type, must be restricted to a small group of broad-winged species; it will include *G. sierræ*, *augur*, *haruspica*, and *major*. *G. haruspica*, though very closely allied to *G. augur*, differs in being constantly much darker and usually larger.

Amathes, *Hübn.* (Noctua, auct.).

The type of this genus is *A. baja*; *Spælotis*, Boisd., may have to be sunk as a synonym of it.

Amathes, *Hübn.*

1. *Amathes phyllophora*, Grote.

Agrotis phyllophora, *variata*, *varix*, and *alternata* are all colour variations of one species; under *A. phyllophora* there are specimens indistinguishable, even in colour, from others labelled "*A. alternata*" by Grote, whilst all intermediate gradations exist between the reddest *A. phyllophora* and the blackest *A. alternata*.

2. *Amathes jucunda*, Walk.

Graphiphora jucunda, Walker, Lep. Het., x., p. 399, n. 27 (1856).

This is the *Agrotis conflua* of Grote's collection, but not of Europe.

3. *Amathes comma.*

Mamestra comma, Walker, Lep. Het., ix., p. 239, n. 40 (1856).
Graphiphora implexa, Walker, *l. c.*, x., p. 405, n. 42 (1856).
Hadena plusiata, Walker, *l. c.*, Suppl., 3, p. 742 (1865).
Xylina collaris, Walker, *l. c.*, p. 752.
Nitocris bicomma, Guenée, Ent. Month. Mag., v., p. 4 (1868).

A common New Zealand form, the sexes of which are very dissimilar.

4. *Amathes atra.*

♀ *Agrotis atra*, Guenée, Noct., i., p. 272, n. 438 (1852).
♂ *A. hydræcioides*, Guenée, *l. c.*

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Graphiphora reclusa, Walker, Lep. Het., x., p. 403 (1856).
G. instipata, part Walker, *l. c.*, p. 404.
♀ var. *Agrotis testaceicollis*, Guenée, Noct., i., p. 273 (1852).
Mamestra lucifera, Walker, Lep. Het., Suppl., 2, p. 668 (1865).

The Australian representative of the preceding species.

5. *Amathes instipata.*

Graphiphora instipata, Walker, Lep. Het., x., p. 404, n. 40 (1856).
Hadena congregata, Walker, *l. c.*, xi., p. 598, n. 94 (1857).
Orthosia ? lunifera, Walker, *l. c.*, p. 747.

An Australian species allied to the preceding.

6. *Amathes velata.*

Graphiphora velata, Walker, Lep. Het., Suppl., 3, p. 710 (1865).

Agrotis cupida of Grote is this species; *A. brunneipennis* is a brownish variety, and *A. placida* a variety of the female, in which the hind wings are dark brown.

7. *Amathes parentalis.*

Agrotis parentalis, Grote, is a species nearly allied to *A. cuprea* of Europe, of which *A. decipiens* is probably only a dark variety; we have one pale example of *A. cuprea* from Washington Territory.

8. *Amathes bicarnea.*

Noctua bicarnea, Guenée, Noct., i., p. 329, n. 546 (1856).
Mamestra plagiata, Walker, Lep. Het., Suppl., 2, p. 664 (1865).

A common North American species.

OCHROPLEURA, *Hübn.*

This is a mere section of the preceding genus, in which the secondaries are shining white.

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Ochropleura plecta.

Phalæna-Noctua plecta, Linneus, Syst. Nat., p. 2851, n. 157.

Ochropleura vicaria, Walker, Lep. Het., x., p. 409, n. 7 (1856).

O. costalis, Moore, P.Z.S., 1867, p. 56.

I can discover no difference whatever between European, African, North American, Japanese, or Indian examples of this species.

ANYTUS, *Grote.*

This genus seems to me much more like *Pharetra* (which I refer to the *Arctiidæ*) than to the *Noctuidæ*, but for the present I have left it where Grote placed it.

Anytus privatus.

Polia privata, Walker, Lep. Het., xi., p. 521, n. 19 (1857).

This is the *Xylina sculpta* of Grote from N. America.

EUCOPTOCNEMIS, *Grote.*

A small genus of broad-winged species with deeply pectinated male antennæ.

Eucoptocnemis fimbriaris.

Heliophobus fimbriaris, Guenée, Noct., i., p. 172, n. 271 (1852).

Graphiphora obvia, Walker, Lep. Het., xv., p. 1707 (1858).

N. America.

TETRAPYRGIA, *Walk.*

Tetrapyrgia graphiphorides.

Tetrapyrgia graphiphorides, Walker, Lep. Het., Suppl., 3, p. 712 (1865).

Elegarda summa, Walker, *l. c.*, p. 713.

Tasmania.

The first type is a worn example. The antennæ of males in this genus are extremely long, tapering, and pectinated strongly to near the tips, which are naked.

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Tetrapyrgia pectinata.

Spælotis pectinata, Walker, Lep. Het., Suppl., 3, p. 707 (1865).
Elegarda orthosioides, Walker, *l. c.*, p. 712.

Moreton Bay.

A rather variable species.

SEMIOPHORA, *Steph.*

Very similar to *Amathes* (*Graphiphora*, auct.), but the males with antennæ strongly pectinated, as in the genus *Eucoptocnemis*; several of the species hitherto referred to *Agrotis*, *Graphiphora*, and *Tæniocampa* belong rightly to this genus.

Semiophora elimata.

Graphiphora elimata, Guenée, Noct., i., p. 333, n. 556 (1852).

The *Agrotis dilucida* of Morrison is indistinguishable from this species.

MAMESTRA, *Ochs.*

The bulk of the species hitherto referred to *Apamea* and *Hadena* are structurally identical with *Mamestra*; the same pattern also runs through the species.*

1. *Mamestra dissimilis*, Knoch.

I cannot distinguish the *M. atlantica* of Grote from this species.

2. *Mamestra thalassina*, Hüfn.

M. nevadæ of Grote is this species.

3. *Mamestra cristifera.*

Acronycta cristifera, Walker, Lep. Het., xv., p. 1654 (1858).

This is the *Mamestra lubens* of Grote.

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* The lashed or smooth eyes of species otherwise closely allied do not in my opinion constitute a safe generic character.

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4. *Mamestra gemina* var. *remissa.*

Noctua remissa, Hübner, Schmett. Eur. Noct., pl. 90, fig. 423.

Xylophasia indocilis, Walker, Lep. Het., ix., p. 178, n. 19 (1856).

N. America.

5. *Mamestra modica.*

Apamea modica, Guenée, Noct., i., p. 207, n. 327 (1856).

Celæna subcedens, Walker, Lep. Het., x., p. 204, n. 11 (1856).

New York.

6. *Mamestra instructa.*

♀ *Hadena instructa*, Walker, Lep. Het., Suppl., 3, p. 733 (1865).

♂ *H. rubescens*, Walker, *l. c.*

Cape (*Trimen*).

7. *Mamestra egens.*

Celæna egens, Walker, Lep. Het., x., p. 263, n. 10 (1856).

Hadena ? stricta, Walker, Lep. Het., Suppl., 3, p. 728 (1865).

This is the *Mamestra cinnabarina*, var. *ferrea*, of Grote, which it will supersede.

8. *Mamestra consanguis.*

Hadena consanguis, Guenée, Noct., ii., p. 97, n. 810 (1852).

Apamea undicilia, Walker, Lep. Het., ix., p. 251, n. 18 (1856).

A common Indian species.

9. *Mamestra renisigna.*

Celæna renisigna, Walker, Lep. Het., x., p. 267, n. 20 (1856).

Hadena depulsa, Walker, *l. c.*, xi., p. 590, n. 75 (1857).

H. ficita, Walker, *l. c.*, Suppl., 3, p. 734 (1865).

H. contracta, Walker, *l. c.*, p. 735.

Cape of Good Hope.

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10. *Mamestra thoracica.*

♀ *Mamestra thoracica*, Walker, Lep. Het., xv., p. 1684 (1858).

♂ *Hadena languida*, Walker, *l. c.*, p. 1728.

Natal (*Gueinzius*).

As I continue the arrangement of the general collection of Noctuites, it is certain that numerous other synonyms will be discovered. As regards tropical New World forms, it is certain that I shall overlook many, from lack of sufficient material; but probably most of these will be cleared up by Mr. Druce, whose series of Central and South American moths is so ample that in some variable genera the most astonishingly dissimilar forms are clearly seen to be mere sports.

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XV. *Descriptions of some new Lepidoptera-Heterocera in the collection of the* Hon. Walter de Rothschild. By Arthur G. Butler, F.L.S., F.Z.S., &c.

[Read June 5th, 1889.]

Plate XII.

The following five new species have recently been received from the Solomon Islands and the neighbourhood of Mombaza, E. Africa.

SPHINGIDÆ.

Cephonodes woodfordii, n. s. (Pl. XII., fig. 1).

Size of *C. apus*, upper surface almost exactly similar to *C. hylas*, the thorax bright olive-green, the abdomen ochreous, with the posterior half of the third and fourth segments black; anterior half of the fourth segment bright chestnut-red; fifth segment divided by a central longitudinal black-brown bar and edged with black; terminal segment glossy black, with ochreous extremity; lateral and anal tufts black: below the body is wholly different; the white colouring, with the exception of a streak bounding the eyes behind the palpi, being wholly absent; the palpi clear ochreous, the pectus and legs deep ochreous; venter dull black, transversely barred down the centre with decreasing ochreous bands, and at the sides with less prominent narrower bands; base of the wings below ochreous instead of white. Expanse of wings, 80 mm.

Guadalcanar, Solomon Islands (*Woodford*).

LITHOSIIDÆ.

Exotrocha securizonis, n. s. (Pl. XII., fig. 2).

♀. Nearly allied to *E. miles* from Alu, but larger; the scarlet band on the primaries hatchet-shaped, being narrower, and emitting a broad streak (on or below the costa) to the base; its outer edge less incurved at inner margin; in highly coloured examples the outer border and veins adjoining are shining steel-

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blue; the black basal patch of the secondaries is larger, sometimes of three times the width. Expanse of wings, 39—43 mm.

Guadalcanar, Solomon Islands (*Woodford*).

Scaptesyle cærulescens, n. s. (Pl. XII., fig. 3).

Primaries with the basal fourth prussian-blue, followed by a tolerably broad band of clear bright chrome-yellow; the anterior part of this band is narrowed, its inner edge being very oblique; outer half of primaries occupied by a large almost semicircular patch of bright chestnut-red with black borders; secondaries dark sepia-brown, with a broad almost central cuneiform band of bright chrome-yellow from costa almost to anal angle; thorax prussian-blue; abdomen sepia-brown; wings below nearly as above; body below dark brown; anal segment dotted and tipped with pure white; legs paler brown; anterior tibiæ and tarsi for the most part white in front; knees of posterior legs white. Expanse of wings, 29 mm.

Guadalcanar, Solomon Islands (*Woodford*).

CERATOCAMPIDÆ.

Brahmæa ocelligera, n. s. (Pl. XII., fig. 4),

Nearest to *B. swansii;* smaller, the primaries rather less produced, the colouring richer, no distinct whitish transverse line towards the base; the black lines across the basal third forming much less acute angles; the large triangular costal patch red-brown instead of black, and marked with three unequal ovoid pale-bordered black spots; its posterior angle is also extended downwards so as almost to unite with the internal patch, which is black, opaque, and subquadrate, the outer limitation of the belt thus formed is of less than half the width of the white post-median band in *B. swansii*, but the intervals between the three succeeding lines are white; the black-centred apical ocellus is smaller; the second and third spots are oval, distinctly pale buff internally and shaded with olivaceous, externally dull pink bordered with white; the fourth to sixth spots are wider than in *B. swansii* and more ocelloid, being black with pale buff internal and olivaceous external borders; the two last submarginal spots are also more ocelloid, broader, with their centres deep olivaceous; the fringe of apical third of primaries pale buff instead of olivaceous, and the remainder of the fringe darker than in *B. swansii:* in the secondaries the basal area is blacker, more distinctly angular, not denticulated externally, and bounded by a considerably narrower white band; four instead of two only of the succeeding intervals between the

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black lines are whitish or pale buff, the brown area occupied by the succeeding eight black lines is broader; the submarginal ocelloid spots are more uniform both in size and colour, those towards the anal angle not being relieved by white as in *B. swanzii;* the external border is decidedly darker; the thorax is uniformly blackish piceous; the antennæ and connecting band cream-coloured; the abdomen is tawny, with slightly paler margins to the segments; the dorsal white line is absent; on the under surface both wings and body are much darker than in *B. swanzii;* the central white band on the wings is very narrow, as on the upper surface; the legs are much paler. Expanse of wings, 122 mm.

About 50 miles inland from Mombaza.

SATURNIIDÆ.

Saturnia wallengrenii, Felder.

♂. Differs from the female chiefly in the much more acutely zigzag outer edge of the central belt of primaries, and the smaller and less prominent marginal white spots on all the wings. Expanse of wings, 89 mm.

About 50 miles inland from Mombaza.

I cannot think that the above distinctions have more than a sexual value; at any rate, it would not be safe to separate the Mombaza insect specifically without seeing the female.

Ceranchia mollis, n. s. (Pl. XII., fig. 5).

♀. Primaries soft greyish brown; the basal, costal, and post-median areas suffused with ash-grey; a transverse oblique snow-white band just before the middle from subcostal vein to inner margin, its inner edge sharply defined and slightly wavy, its outer margin diffused; an oval transverse ocellus, black edged with whitish, and encircled by a rose-coloured line immediately beyond the cell; secondaries with a similar ocellus, but encircled with brownish instead of rose-colour; external two-fifths ash-grey, shading into brown towards outer margin; body white, antennæ black; wings below greyish brown, with white internal areas; the ocelli of the upper surface represented by white-bordered black spots; palpi and pectus brown; venter white. Expanse of wings, 94 mm.

About 50 miles inland from Mombaza.

The pectinations of the antennæ are less regular in length in this species than in the other described forms of *Ceranchia*.

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Explanation of Plate XII.

Fig. 1. *Cephonodes woodfordii.*
2. *Exotrocha securisonis.*
3. *Scaptesyle cærulescens.*
4. *Brahmæa ocelligera,*
5. *Ceranchia mollis.*

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XVI. *An account of* Prof. Plateau's *recent experiments on the vision of Arthropods.* By David Sharp, M.B., F.L.S., F.Z.S., &c.

[Read June 5th, 1889.]

Plate XIII.

Prof. Plateau, who is so well known by his numerous researches on the physiology of Arthropods, has recently published a series of five memoirs, giving details of experiments he has carried on with the object of ascertaining what are the actual powers of vision possessed by insects and other Arthropods. The experiments are of great interest, and, as they are published in a work that does not come into the hands of many entomologists, I have thought that a brief account of them would be of interest to the Fellows of the Entomological Society of London. The memoirs in question are called:—

"Recherches expérimentales sur la vision chez les Arthropodes."

"Premiere partie: *a*, Résumé des travaux effectués jusqu'en 1887 sur la structure et le fonctionnement des yeux simples; *b*, Vision chez les Myriopodes."

'Bulletin de l'Académie royale de Belgique,' 1887, Nos. 9 and 10.

"Deuxième partie: Vision chez les Arachnides." *Op. cit.*, No. 11.

"Troisième partie: *a*, Vision chez les chenilles; *b*, rôle des ocelles frontaux chez les Insectes parfaits." *Op. cit.*, 1888, No. 1.

"Quatrième partie: Vision à l'aide des yeux composés. *a*, Résumé Anatomo-physiologique; *b*, Expériences comparatives sur les Insectes et sur les Vertébrés." Memoires couronnés, publiés par l'Académie royale de Belgique, 1888, vol. xliii.

"Cinquième partie: *a*, Perception des mouvements chez les Insectes; *b*, Addition aux recherches sur le vol des Insectes aveuglés; *c*, Résumé général." 'Bulletin de l'Académie royale de Belgique,' 1888, No. 11.

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The first chapter is of an introductory nature, being devoted to a review of the actual condition of anatomical and physiological knowledge as to simple eyes, and speaks in very favourable terms of Patten's recent researches.

In the second chapter he passes to an account of his own experiments on Myriopods, commencing with *Lithobius forficatus*. By placing specimens in a box lighted in certain parts but obscure in others he found that this species is very sensitive to light; but this sensitiveness he considers is not necessarily due to the eyes, for other Myriopods, such as *Geophilus* and *Cryptops*, which are destitute of eyes, display almost as great a sensitiveness to light, and this he considers is due to a dermatoptic faculty. After this he proceeded to test the capacity for perceiving objects by putting the *Lithobius* in a maze or labyrinth formed by placing pieces of wood, card, or other such materials in a circle interrupted by gaps, and then forming other circles outside this (see Pl. XIII., fig. 1). Any creature possessed of the sense of sight would escape from such a labyrinth by passing between the gaps by means of a slightly zigzag course, while an animal not able to see might be expected to run against the pieces forming the interrupted walls of the labyrinth. The *Lithobius*, on being placed in the centre of the maze, walks straight up to the obstacles till it comes against them with its antennæ, and then turns to one side, passes through a gap, and repeats this process with the next series of obstacles, and so on until it escapes, the rate of progress being about one inch per second. The eyes of the *Lithobius* were then covered with impervious black dye, and it was found that the insects then escaped in an exactly similar manner, and quite as rapidly as those whose eyes were not covered. Experiment was then made with specimens of *Lithobius* from which the antennæ had been removed; these proceeded in a similar manner to those that were intact, but, not being warned by their antennæ of the proximity of the objects, they actually ran against these, then turning to one side, knocked against another object, and so on (Pl. XIII., fig. 1, track *c*).

Similar experiments were then made with *Cryptops*, a naturally blind Myriopod, and as a result of a comparison, Professor Plateau concludes that in *Lithobius*

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there if scarcely anything of the nature of true vision ("la vision proprement dite doit être à peu près nulle," Part I., p. 28).

Next he placed *Lithobius* on the floor of a room lighted at one end, and found that the rule was that the creature walked in lines parallel with the direction of the light, either towards it or away from it. Some moveable obstacles were constructed out of sheets of cork fastened to the end of a stick, so that it was easy to place one of these small walls at any spot in the way of the insect; where this was done it was found that the *Lithobius* invariably walked against the object till it touched this with its antennæ, and this proceeding was repeated even one hundred times in succession. By using instead of the plain cork a piece of white cardboard, a different result was obtained; if the white cardboard was so illuminated as to form a strong contrast to the floor of the room, then the *Lithobius* was aware of the presence of the obstacle, and changed its direction so as to pass to one side of it. By using a piece of cork with white paper on one side of it, the other being left of a natural colour, the above results were completely demonstrated; similar experiments were then made with other colours, the result being that the *Lithobius* was aware of the presence of an object when much light was reflected from it.

A similar set of experiments with other Myriopods (*Scolopendra subspinipes*, *Julus londinensis*, *Glomeris marginata*), and also a few other plans for testing their perceptions were employed; and Professor Plateau thus summarises the results of his observations on Myriopods:—

1. Myriopoda distinguish between light and darkness.

2. As this capacity exists in blind species, as well as in those possessed of eyes, the perception of light may even in the latter be in part due to dermatoptic sensation.

3. Myriopods see very badly, and supplement the inefficiency of their sight by the sense of touch, which is located chiefly in the antennæ.

4. Species possessing eyes are but little better off in vision than those that do not possess eyes.

5. Myriopods endowed with visual organs perceive the existence of an object placed on their line of route only

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when it reflects much white light, or light belonging to the more refrangible region of the spectrum. This perception is probably in part dermatoptic.

6. Myriopods do not perceive the form of objects.

7. Some of them appear to perceive considerable movements.

Part II.

The second portion of Professor Plateau's researches is devoted to Arachnides (Araneides, Scorpionides, and Phalangides). Spiders, it would appear, do not see their prey well, if at all, and without giving details of the experiments, it will be sufficient to give the learned Professor's summary of their results (Part II., p. 35):—

1. Spiders in general perceive at some distance changes of position of voluminous bodies.

2. Hunting-spiders (Attides, Lycosides) are probably the only ones that perceive the movements of small objects.

3. They perceive these movements at a distance varying, according to the observers and to the species observed, between $\frac{3}{4}$ in. and 8 in.* (2 to 20 centimètres).

4. The distance at which the prey is seen sufficiently well for its capture to be attempted is only from $\frac{3}{8}$ in. to $\frac{3}{4}$ in.

5. Even at this slight distance vision is not definite, since hunting spiders make numerous mistakes.

6. Web-making spiders have a vision that at all distances is contemptible; they are only aware of the presence and position of their prey by the vibrations of their snares, and endeavour to catch objects quite dissimilar from insects when these objects cause shocks and vibrations in the webs similar to what would arise from the movements of winged Arthropods.

Part III.

In the third memoir Plateau passes to the true Insecta, but still confines his observations to the functions of simple eyes: this part of his memoir consists of two distinct portions, viz., *a*, vision in caterpillars; *b*, the function of frontal ocelli in perfect insects.

* In a note Prof. Plateau says that he thinks this limit should be reduced to $4\frac{1}{2}$ in.

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In observing caterpillars the methods used were those I have already mentioned in the case of the Myriopoda, in addition to another that I have not yet alluded to, *viz.*, placing a caterpillar on an apparatus somewhat like a parrot-perch, a transverse rod supported by a very slender upright stem, such as a stick held in the horizontal position by a needle. When placed on such an apparatus the caterpillar seeks to escape, and when it arrives at one end of the rod extends itself in various directions to find another object on to which it can pass. When the caterpillar was in this position Prof. Plateau placed objects near to it with a view to ascertaining if they were perceived by the eyes of the insect, and if so, at what distance. He found that the hairs on the caterpillars were very important aids to them in detecting the proximity of objects, so that it was necessary to pay attention to their existence and see that they were not touched; he found the distance at which the existence of an object was perceived by the caterpillar to vary from something less than a $\frac{1}{4}$ in. to $\frac{3}{4}$ in.; no caterpillar experimented with perceived a rod $\frac{1}{8}$ in. in diameter at a distance of 3 centimètres ($1\frac{1}{8}$ in.). Under similar circumstances a *Julus* distinguished nothing, and Prof. Plateau considers therefore that we are justified in attributing to caterpillars formation of an image on the retina, and as a consequence a true vision.

[This, however, is, I think, going too far. Professor Plateau's experiments have shown that a stick is perceived by a caterpillar at a short distance, and render it highly probable that it was perceived by the aid of the ocelli; but in what way the ocelli operated there is no evidence at all, and that the perception was by means of an image on a retina is rendered improbable by the extremely short distance at which alone the existence of an object was detected.—D. S.]

Professor Plateau gives a summary of the results of his observations on caterpillars, which I translate as follows:—

1. Either the structure of the eyes in caterpillars is still imperfectly known, or the deductions made from it are partly erroneous, for the eyes have a more important function than that of simply distinguishing between light and darkness. Caterpillars *see*, but see badly.

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[The latter part of this thesis I do not think is established by the investigations.—D. S.]

2. As was supposed by Cornalia, Landois, and Maurice Girard, the limit of distinct vision is short; according to my observations it is generally about a centimètre ($\frac{2}{5}$ in.).

3. At greater distances caterpillars can perceive the existence of large objects, but they do not distinguish their nature; they no longer see, using the word in an exact sense.

4. They do not perceive movements of objects in their neighbourhood at a greater distance than their limit of distinct vision.

5. Many caterpillars that are more or less pubescent bear, on the first segments, tactile setæ, by which they are immediately warned of the presence of objects when these are touched by the setæ.

6. All caterpillars make constant use of their antennæ for exploring the surface of the object they are moving on, and that of such bodies as they may meet during their advance.

The next subject treated by Prof. Plateau is one that has been previously much discussed, viz., *the function of the ocelli of perfect insects.*

He proceeded by obscuring the ocelli and compound eyes, 1 alternately, 2 conjointly, and then observing to what extent the movements of the insects were effected. The modes used for obscuring the optical organs were also two in number—1st, and chiefly, by covering the ocelli or compound eyes with a mixture of oil and black pigment; 2nd, by severing the nerves of the organs by means of a cataract-knife.

[As regards this part of Prof. Plateau's subject, I would remark that I think the question discussed is psychologically considerably more complex than those who have written on the subject have perceived. A first objection strikes one: it is that the function of the optic organs generally being doubtful, or at least very ill-known, it is not probable that the more special question as to what is the particular function of the ocelli can be satisfactorily dealt with. To this may be added a second criticism, that the methods of observation that have been used bear only on the question as to what

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influence the ocelli have on the locomotive faculties, or even more limitedly, what influence they have on the guiding of flight. It is not therefore a matter of surprise that the function of the ocelli in insects possessing also compound eyes has not yet been deciphered.

There are also some serious objections arising from the imperfections of the methods used. It is admitted by the experimenter that the black oil is not quite effective ("que les insectes dont les yeux sont enduits perçoivent encore un peu de lumière" (pt. 3, p. 29)), and it is evident that this perception may possibly have an important influence on their movements. The method of incising the nerves is open to still more serious objections, for, according to Plateau, it usually kills the insect, or so stuns it that satisfactory observations are difficult to make. It is true that he states that large Diptera bear the mutilation better than other insects, but when he comes to detail his observations on them it is evident from his remarks that this method is not trustworthy. When three specimens of *Eristalis* (pt. 3, p. 31), on being released, after having the nerves of their ocelli and compound eyes incised, refused to fly and fell to the ground, he says it may be because they had been too violently treated. On the other hand, when incised specimens flew away in an upward direction, there is, of course, no sufficient evidence that the incision had been carried out in a quite perfect manner: in such a case the insect should have been recaptured, killed, and submitted to a careful post-mortem examination in order to ascertain whether all the four incisions made had completely severed the nerves.

Taking all these points into consideration, I must look on this part of Plateau's observations as of minor value, and shall therefore not give the details of his experiments, but merely translate his summary of their results.—D. S.]

From the attempts of the earlier naturalists, Hooke, Swammerdam, Reaumur, Marcel de Serres, Dugès; from the researches of Forel, and from my own numerous experiments, two sets of results may be deduced; the first are facts, not lightly to be contested; the others are hypotheses of a plausible nature. The results in the first category are:—

1. Winged diurnal insects—Hymenoptera, Diptera,

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Lepidoptera—that have been made blind, either by covering the whole of the eyes with black pigment, or by severing the nervous cords, and that are afterwards released in the open air, rise vertically in the atmosphere to a great elevation.

2. When the function of the compound eyes is destroyed, the ocelli remaining intact, insects (Hymenoptera, Odonata, Diptera) behave exactly in the same manner as they do when the ocelli are likewise destroyed. That is to say, when liberated in the open air, they rise upwards vertically, and when flying in a room lighted by windows situated on one side only, they also present the same peculiarities as are seen in individuals all of whose eyes have been either covered over or incised.

3. If the function of the ocelli be alone destroyed, the compound eyes remaining intact, diurnal winged insects are apparently not aware that they have been deprived of any organ of sensation, and to all appearance behave exactly like insects in their natural state.

4. In diurnal insects furnished with compound eyes, the simple eyes are of almost no use, and in every case only afford to their possessors feeble sensations of which they are unable to make use.*

The results that we may consider as plausible hypotheses supported by a certain number of previously ascertained facts are :—

1°. Diurnal insects, in which the effectiveness of all the eyes has been destroyed, still possess dermatoptic perceptions :

2°. They must be pretty nearly reduced to the use of these latter perceptions when their frontal ocelli still remain to them :

3°. Dermatoptic perception must be the chief cause of the ascending flight of blinded insects liberated in the open air :

4°. The ocelli cannot be of use either for perceiving movements of neighbouring objects, nor for distinguishing light in comparatively gloomy conditions.

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* This conclusion is only correct so far as locomotion is concerned, no experiments having been made with a view of testing to what extent the ocelli may be useful in industrial occupations, or actions other than those of locomotion.—D. S.

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Part IV.

Vision by means of compound eyes. a. *Anatomico-physiological summary.* b. *Comparative experiments on insects and on Vertebrata.*

In this fourth section Prof. Plateau passes to the subject of compound eyes. Discussing in a prefatory manner the present state of anatomical and physiological knowledge, he inclines to adopt the views of Patten, that the perception of the compound eye is by means of a retinidium located in the crystalline cone, or in a corresponding situation in such insects as do not possess a true crystalline cone; and he considers if this be the case there can be no true perception of form or image because of the great extent in the vertical direction of the retinidium.

After this more than sixty pages are devoted to an account of his own experiments, and to descriptive and critical remarks on the observations of other naturalists as to the powers of visual perception of insects with compound eyes.

Plateau's first series of experiments was conducted in the room lighted on one side only, and consisted of placing small moveable objects—more especially vertical sheets of cork of white or neutral colour—in the way of insects to see if they were avoided, and also of placing the insects in the centre of the labyrinth or maze already alluded to, and observing their ways of making their escape from it.

Gryllotalpa vulgaris, when placed in the maze, actually ran against each piece that was in its way, whether the piece were light or dark, shaded or illuminated. The same insect, when placed on the floor of a room, did not apparently see the pieces placed in its way, even when these were of white colour and fully illuminated.

Periplaneta orientalis was tested, and it was found that it proceeded with its long antennæ extended, and walked directly towards the obstacles until these were touched with the antennæ: when this occurred the object was explored by the antennæ, and when its limits were determined by these it then passed the obstacle, the track being of the nature indicated by *c c c*, fig. 1. But this insect distinguishes between a dark object and an object reflecting much light, for it explores the latter delicately

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by means of its antennæ, but walks in a stupid manner against black obstacles, which Plateau says it probably takes for dark cavities where it may conceal itself. When, instead of placing a comparatively large obstacle in the way of the insect, Plateau made use of some small object, such as a pencil or the handle of a knife, so that the antennæ did not come into contact with it, but projected on each side of it, then the insect invariably knocked against the obstacle.

Similar results were obtained with *Forficula auricularia*: the insect apparently did not at all perceive black obstacles, or such as were of a neutral colour, but it did perceive at a distance of 5—10 centimètres (2—4 in.) an obstacle of white colour fully illuminated, and turned to one side sufficiently to avoid it.

Locusta viridissima, when placed in the middle of the maze, walked straight up to the first obstacle, explored it with its antennæ, then climbed on it, but when on it did not perceive even the ground on the other side, but likewise ascertained the existence even of this by the aid of its antennæ.

Carabus monilis was then tried; it walked against the objects, and then used its antennæ to explore them, then circumvented the object, and proceeded in a similar manner with the next obstacle, following, however, some particular direction. When the eyes were obscured with black pigment, though it acted in a similar manner with its antennæ, it did not follow any general direction, but wandered about at random. *Carabus nemoralis* acted in a similar manner, there being, however, this difference, that in the latter the general direction of its movements is towards the light, while in *C. monilis* it is away from the light. *Carabus auratus* was apparently even more stupid. And similar results were obtained with other *Carabidæ*.

Cicindela campestris was then tried: this insect is very active, and in order to prevent it using its wings these were clipped; it then ran with great rapidity. Another specimen that was not fond of flying was used without any mutilation: both gave similar results. The chief difference from *Carabidæ* was found to be that the *Cicindela* evidently distinguished the streaks of light that passed through the gaps between the obstacles, but there was no indication of the species perceiving the

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obstacles. *Necrophorus vespillo* and *Telephorus lividus*, when tried, knocked against all the obstacles in their way. *Geotrupes sylvaticus* explored objects it came against by means of its antennæ, and when these were cut off, used one of its front legs for the purpose of exploring an obstacle.

Hymenoptera were tried, and gave most instructive results. I shall translate literally Professor Plateau's remarks (Part IV., pp. 39, 40), on these clever and active insects:—

"My first experiments on Hymenoptera, both deprived of their wings and unmutilated, whether moving in the maze or tested by means of the vertical obstacle at the end of a stick, astonished me profoundly.

"These insects *appeared* to guide themselves amongst the obstacles with remarkable certainty, avoiding the barriers when these were at a distance, and apparently behaving in every respect like creatures possessing good powers of sight.

"Certainly, if I had contented myself with a few superficial observations, I should have been persuaded that Hymenoptera are an exceptional group possessed of definite vision.

"This illusion—a very pardonable one—was due to the rapidity of action of the creatures on which I made my first observations. The strangeness of the results having induced me to make fresh experiments, I discovered some species whose ambulatory movements were less rapid. This enabled me to analyse the details, and to detect the explanation, as simple as it was certain, of the facts.

"This explanation may be thus summarised: The hymenopteron directs its course, with but few exceptions, straight towards the light, that is, towards the windows. In such conditions the obstacles forming the maze, or those placed at the end of a stick, give rise, according to their position, to a shadow cast in front of them, a shadow which is, in fact, of a double nature, a faint one, or penumbra, and a darker and narrower shade (Pl. XIII., fig. 2).

"If in pursuing a straight course the creature haps on a gap between the obstacles, it naturally takes advantage of this, as indeed a beetle would do; but if across its road there intervenes an upright obstacle, the

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hymenopteron continues to direct itself towards it, evidently without perceiving it, or, at any rate, without perceiving it distinctly, until the insect's body, or a portion of its body, has penetrated into the shadow. Instantly the insect receives a *general impression* (impression that may be either dermatoptic or visual, possibly both); it then hesitates for a very brief instant, then alters its course in a right angle, makes literally a half-turn to the right or to the left, proceeds *parallel to the outline of the shadow*, then again resumes its course towards the source of light, making again a similar change of direction when it again passes into the shadow of a fresh obstacle."

Thus he concludes that Hymenoptera are largely guided by sensations arising from the distinctions between light and shade.

After describing a number of other observations on insects and on Vertebrata, these latter made for the sake of comparison, Prof. Plateau passes to the account of his last series of observations.

Part V.

a. *The perception of movements in insects.* b. *Supplement to the experiments on the flight of insects rendered blind.* c. *General summary.*

He reminds us that if we walk about in a field or garden the insects fly from us in all directions, but that if we stand still they are no longer frightened, and notwithstanding our presence pursue their occupations. Thus we may conclude that it is our movements, not our bodies, that they perceive. If movements are made slowly he found that after gaining some experience he was able to actually touch insects with his finger once, twice, or even oftener, without disturbing them. He accordingly made a series of observations and tabulated the results, so as to show the distance at which insects perceived the movements of the body or arm of the observer, and whether they allowed themselves to be touched or not. Commencing with Hymenoptera, he gives a list of 28 species, and found that they perceived movement at a distance which on an average may be said to be about eighteen inches or two feet, and all the

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species observed he was able to touch, except two species of *Ichneumonidæ*, of the genus *Pimpla*.

Twenty-eight species of Diptera were observed; the distance at which they perceived movement was found to be rather greater than in the case of Hymenoptera, being on the average about 26 in.; seven or eight species he was not able to touch.

Diurnal Lepidoptera were found to be still more acute; the average distance at which they perceived a movement of the body of the observer being four or five feet: of the fourteen species tabulated he was able to touch twelve.

Odonata, or dragon-flies, are endowed with magnificent optical organs, and are most active creatures; hence entomologists assign to them acute powers of sight. Plateau discusses this reputation, and decides that it is exaggerated; the larger species perceive movement at a distance of three to six feet, rarely did they seem to detect it at a distance of nine or ten feet.

Amongst Coleoptera, *Cicindela campestris* and *hybrida* were found to be as well endowed as Diurnal Lepidoptera, while species of *Carabus* were very stupid, and *Dytiscus dimidiatus* did not apparently perceive movement at all.

We have next a series of interesting observations made in a room lighted by two windows at one end: these windows were closed by shutters, in one of which there was, for the admission of light, a square orifice of about four inches in each direction; while in the other shutter there was a similar orifice so arranged that it moved round in a circle by means of a revolving apparatus. The size of the orifices was capable of variation, either separately or together, and by these means the Professor ascertained some interesting facts. Insects, when set at liberty in the room, flew towards these lights; they perceived that the one of them moved, but they did not object to this, and directed their flight towards it as much as towards the stationary orifice; so perfect, indeed, was the perception of movement, that the motion of the insect in flight was controlled by the movement of the orifice to such an extent that the direction of the flight became spiral. The results of this series of observations may be thus arranged:—

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A. *One orifice being stationary and the other, of the same size, in motion.*—The insects directed themselves indifferently to one or the other, no preference being observed.

B. *The two orifices of the same size, but one arranged so as to admit a greater quantity of light than the other.*—The insects directed their flight most frequently to that where the light was most intense, whether this were the stationary or the moving one.

C. *The two orifices of unequal size, one being four inches each way, the other two inches.*—The insects then preferred the larger orifice, whether stationary or moving.

The final series of experiments recorded by Plateau refers to a curious phenomenon, *viz.*, that winged insects, whose eyes are covered by pigment, when they are set at liberty, fly vertically upwards to a great elevation. Plateau had previously considered that this was due to their still perceiving the light, partly perhaps because the pigment did not completely blind them, and perhaps partly because of a general dermatoptic sense. Some objections having been made to this conclusion by Forel and others, he undertook a fresh set of experiments with Nocturnal Lepidoptera: the specimens were released when it was quite dark, and after their eyes had been covered with black pigment. The result was found to be that the insects under these conditions did not rise vertically, but either flew away horizontally or descended to the ground.

[In Prof. Plateau's account of this set of experiments I do not find any statement as to whether the compound eyes and the ocelli were both covered with pigment or only the former.—D. S.]

In concluding this imperfect *résumé* of Prof. Plateau's interesting researches, I cannot refrain from expressing my thanks to him for having given himself so much trouble in the matter. His observations, I think, show conclusively that whatever may be the other functions of the optical organs, their relation to light is the chief mode by which the insect is guided when on the wing: when walking it seems, however, probable that tactile sensations and specific habit are the chief factors in deciding a particular direction.

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There are one or two points as to which, I think, further and more special experiments are needed. I may mention that I think a set of observations should be made to test to what extent the covering the optic organs with pigment is effectual in excluding light from them. It is admitted that it is only partially effective; and it appears to me that when this is the case there is not sufficient ground for concluding that the insect is guided by a dermatoptic sense.

I think, too, that observing and delineating the actual tracks made by particular species when escaping from the labyrinth would be of considerable value; the tracks shown by Prof. Plateau in his figures being, as he tells us, diagrammatic.

The question of the actual direction taken by insects in flight appears to me by no means a simple matter. It must be looked on as a resultant of several conditions. Different species have different habits in regard to the height and direction of their ordinary flight, and this must very greatly influence the direction they take when endeavouring to escape. When an insect has been subjected to such an unpleasant experience as being captured and having its eyes covered with blackened oil, it is only natural to assume that it would, when the bonds were taken from it, attempt to simply get away. The habitual direction in which an insect would start to fly away when it was liberated in a natural condition must be taken into consideration. If the usual way of a particular species be to rise a little and then change its direction in accordance with influences of light and shade that may come into play after it has started, it is not surprising that it should continue to rise when (the function of its eyes being interfered with by pigment) the normal sources of orientation do not affect its nervous system.

Perhaps I may be allowed, in conclusion, to summarise the general impressions I have derived from the study of Prof. Plateau's valuable experiments as follows:—

1. That insects in motion are guided largely by the direction of light and the existence of lights and shades. That when walking they are guided by a combination of light-impressions, with specific habit (that is, going upwards or downwards, towards the light or away from the light), and by tactile impressions; these latter not acting when the insect is in flight.

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2. That there is at present no evidence at all that the light-perceptions are sufficiently complex to be entitled to be called seeing; but that, as the large development of the compound eye permits the simultaneous perception of movement, its direction, and of lights and shades over a certain area, a dragon-fly may pursue and capture another insect without seeing it in our sense of the word seeing.

Explanation of Plate XIII.

Fig. 1. Plan of the maze used by Plateau. *a, a, a,* the undulatory track of an animal with good sight (vertebrate) when escaping; *b, b, b,* zigzag track of an insect that detects the presence of the pieces by means of their shadows (Hymenoptera); *c, c, c,* track of an insect that runs against the objects (Coleoptera, *e.g.*).

Fig. 2. Some of the pieces of the maze, with the shadows and penumbræ cast by them. *o, o, o,* track of a hymenopteron turning aside only when it enters the deep shadow; *p, p, p,* track of a hymenopteron sensitive enough to perceive the penumbra.

Fig. 3. General view of the maze as used by Plateau.

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XVII. *Further additions to the* Rev. T. A. Marshall's *Catalogue of British* Ichneumonidæ. By JOHN B. BRIDGMAN, F.L.S.

[Read July 3rd, 1889.]

THE increasing interest taken by British lepidopterists in the parasites they may unfortunately breed is shown by the length of these papers of additions to the British list. Ichneumons new to Britain or Science are continually being sent to me. I have already sufficient material for another paper had I but the time to work it out. Since my last paper hymenopterists have sustained a severe loss by the death of A. E. Holmgren, the eminent Swedish entomologist, one who perhaps has done more for the portion of Hymenoptera he studied than any previous author. Gravenhorst, in his three volumes of 'Ichneumonologia Europeæ,' while he accurately described an enormous host of ichneumons, gave far too little description of structure. This defect was greatly remedied by the numerous papers of Wesmael, principally as far as the family of Ichneumon was concerned. A. E. Holmgren still further improved on the very excellent work done by Wesmael, when he published the first two parts of 'Ichneumonologia Suecica'; the third part, which was to have contained the Ichneumones Pneustici, has not been published, and I fear never will now; he was engaged on it at the time of his death. I received a letter from him the end of last November, asking to borrow the new species I had described. Besides these monographs he published monographs of the Swedish Ophionides, Tryphonides, Pimplides, and of the genus *Campoplex*, with good clear descriptions both of structure and colour, the former of which was very much needed; the Cryptides was the only family he had not monographed. Besides these he wrote several papers in various magazines; the date of his first paper is given in 'Literatura Hymenopter-

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orum, Moesáry,' as 1855. His descriptions leave nothing to be desired, unless it is that the full descriptions of his monograph of the genus *Campoplex* was not written in Latin or German instead of Swedish.

Ichneumon culpator, Sch.

Mr. W. J. Cross, of Ely, gave me a variety of the female, which had the legs and abdomen black.

Ichneumon insidiosus, Wesm.

Wesm., Tent., 46, ♀.

I took a female at Brundall, August, 1878.

Ichneumon tempestivus, Holm.

Holm., Ich. Suec., 74.

This species appears to be not uncommon, but has not been previously recorded as occurring in this country.

Ichneumon macrocerus, Thom.

Ann. de la Soc. Ent. de France, 1886.

This insect was identified for me by Prof. Thomson, and was taken at Brundall, August, 1880.

Ichneumon emancipatus, Wesm.

Wesm., Tent., 46, ♀; Holm., Ich. Suec., 98, ♂ ♀.

I took a male of this many years ago in the neighbourhood of Norwich.

Ichneumon vulneratorius, Zett.

Holm., Ich. Suec., 118.

Taken by Mr. P. Cameron in Scotland, and by Mr. G. C. Champion in Ireland.

Ichneumon Haglundi, Holm.

Holm., Ich. Suec., 129.

A male of this was bred by Mr. T. R. Billups in 1886 from *Arctia fuliginosa*, and kindly given to me.

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Ichneumon plagiarius, Wesm.

Wesm., Mant., 47, ♀.

The male in structure is like the female, and differs only in coloration, in having a white spot on each side of the clypeus, facial orbits to the vertex, and a line before the wings, white; the line below the scutellum is sometimes white; there is no white at the apex of the abdomen; the coxæ are a little darker, and antennæ quite black.

I have taken both sexes in the neighbourhood of Norwich, in August, a few years ago.

Ichneumon pulchellatus, n. s.

Niger, abdomine pedibusque maxima ex parte rufis; scutello flavo.

Shining punctate; head transverse; behind the eyes scarcely narrow; clypeus punctate, apex truncate; teeth of mandibles unequal, superior much the longer; antennæ of male about three-fourths the length of the body, of the female but little longer than the head and thorax; 1st joint of flagellum about twice as long as wide, penultimate joint quadrate in the male, the 11th quadrate in the female, apical joints transverse except the last. Mesonotum rather closely and somewhat coarsely punctate; scutellum somewhat rounded, punctate; metathorax shining, rather coarsely rugose, deeply notched behind, with five very distinct areæ; supero-medial area transverse, very narrow, the posterior indistinctly tridivided; spiracles of female ovate, and more elongate in the male. Abdomen of the female almost cylindrical, about as wide as the thorax; apical half of 2nd, 3rd, and 4th segments of equal width, the 2nd segment rather longer than wide, 3rd transverse; in the male the apex of the 2nd segment is the widest, and from this to the apex it gradually tapers, slightly narrower than the thorax; 1st segment shining, petiole punctate, middle areæ of post-petiole obscurely rugulose, smooth at the apex, lateral areæ slightly rugosely punctate; 2nd and 3rd segments in the female, 2nd to 4th in the male, punctate on a finely reticulate ground; apical segments almost free from sculpture; sides of abdomen pilose; gastrocœli on the 2nd segment moderately shallow in the female, rather deeper in the male, the space between them about equal to the middle area of the post-petiole; the post-petiole of

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the male is more distinctly sculptured than the female; aculeus projecting. Areolet of wings pentagonal, open above; transverse anal nervure divided one-third from the bottom. Legs moderate.

♀. Black; palpi brownish red; base of mandibles and a spot above yellowish red; antennæ dark brown, the 9th, 10th, and 11th joints of the flagellum above slightly paler; a mark on the inner orbits and a spot on the vertex, a short line before, a longer one beneath the wings, and scutellum, yellow, the latter black at the base; apex of 1st segment of the abdomen, 2nd, 3rd, and 4th, and sides of 5th segments, red. Legs red, coxæ black, trochanters somewhat browner; femora brownish, base and apex paler; joints of middle and hind tarsi slightly brownish in the middle, and the apical joints of all the tarsi brownish. Stigma piceous, tegulæ black.

♂. Black; palpi, mandibles, a spot above them, clypeus, middle of face, facial orbits, a mark on each side of the vertex, scape beneath, a line before and beneath the wings, another line on the lower part of the prothorax above the front coxæ, scutellum and a faint mark beneath it, yellow. Abdomen as in the female, but the 5th segment sometimes entirely red. Legs red, coxæ and trochanters black, the anterior and middle pair with a yellowish mark beneath, front and middle femora yellowish in front, hind femora red, front tibiæ and tarsi palish, apex of tarsi slightly fuscous. Length, 7—8 mm.

Male and female bred by Mr. J. E. Fletcher from *Eupithecia pulchellata*. I have another male sent to me by Mr. Bignell bred from the same host.

It belongs to Section 7. B. b. of Holmgren's Ich. Suec.; it is evidenly like *Ichneumon eupithecia*, Brischke, Ich. d. Prov. W. u. O-Preuss, but differs in the shape of the metathoracic spiracles, which Brischke says are elliptic, almost circular; but in this species they are far from circular, and the gastrocœli are evidently narrower.

Platylabus transversus, n. s.

Niger, facie et scutello albo-picta, femoribus tibiisque anticis rufis.

Face and clypeus punctate, the latter truncate at the apex, which is shining; forehead almost shining and free from punctures, behind the eyes slightly narrow. Mesonotum finely punctate, rather shining; scutellum somewhat elevated, marginated to beyond the middle; metathorax rather shining, feebly rugose;

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supero-medial area transverse, lunate; postero-medial area wide, imperfectly tridivided; mesopleura finely punctate, rather dull below, smooth and shining above. Abdomen subovate; 1st segment smooth and shining, remainder transverse, somewhat shining; 2nd segment finely punctate, interstices alutaceous, the base almost free from punctures; gastrocœli small, space between them about equal to the width of the central area of the post-petiole; 3rd finely punctate, interstices alutaceous, remainder more sparingly punctate; genitalia rather stout. Legs moderate, femora stout. Areolet of wings closed above; recurrent nervure received in the middle.

Black; a narrow streak on each side of the orbits from just above the antennæ to below the eye on to the cheek and side of clypeus, and two small dots beneath the antennæ, scape beneath, scutellum, post-scutellum, and tegulæ, whitish yellow. Front and middle legs reddish; coxæ and trochanters black, hind legs black; femora only red, and these are black at the knees. Stigma black, and a piceous spot in the middle of the tegulæ. Male. Length, 7·5 mm.

This belongs to the *P. pedatorius* group, but differs in the colour of the hind tibiæ and transverse segments of the abdomen; the scutellum and post-scutellum are pale, as in *P. iridipennis*. Two males were bred by Mr. W. J. Cross, of Ely, from the larvæ of *Cidaria saggitata*, in July, 1888.

Phæogenes varicolor, Wesm.

Diadromus varicolor, Wesm., Tent., 211, ♂ ♀; Mant., 92, ♂ ♀.

D. intermedius, Wesm., Tent., 211, ♂.

This seems to be a very variable insect. I took four males at Gunton, by Cromer, on August 1st, 1887; of these four, one is the variety with the middle of the abdomen red and legs partly dark, which Wesmael originally described as *D. intermedius*; the other three have the abdomen black, two have the coxæ red, and the other has the hind coxæ black; the mesonotum is shining, with rather coarse punctures; the metathorax is shining, rugose, the sculpture varying in strength; the supero-medial area pentagonal, rather longer than wide.

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Phygadeuon flavopunctatus, n. s.

Niger; abdominis medio pedibus anticis et tibiarum posticarum basi rufis, tarsis posticis annulo albo, facie scutelloque flavo maculato.

Head narrow behind the eyes, not concave in the middle, apex of clypeus rotundate, forehead punctate, interstices finely reticulate; antennæ about as long as the body; 1st joint of the flagellum almost four times as long as wide. Mesonotum shining, somewhat coarsely punctate; transverse fovea at base of mesonotum consute; scutellum slightly gibbose, shining, somewhat sparingly punctate; metathorax shining; posterior portion of superior surface rugose, not coarsely so; supero-medial area elongate, longer than wide, not closed above, lateral areæ not divided; posterior face rather coarsely rugose, not subdivided; spiracles large and oval. Abdomen smooth and shining, longer than the head and thorax, and narrower than the latter; 1st segment slender, spiracles placed beyond the middle, post-petiole longer than wide, very little wider at the apex than at the base, petiole bicarinated, feebly longitudinally rugose; 2nd segment one-third longer than wide; 3rd a little shorter; remainder transverse. Legs slender; tibiæ somewhat spinulose. Areolet of wings pentagonal; posterior inferior angle of discoidal cell obtuse; transverse anal slightly anti-furcal, divided below the middle.

Black; clypeus, a squarish mark below the antennæ, a spot on the scutellum and sometimes a minute dot beneath it, and base of wings, yellow. Apex of 1st segment, 2nd, 3rd, and 4th, red. Front and middle legs reddish yellow; coxæ and trochanters black; hind legs black; apex of trochanters, the extreme base and apex of femora, less than the basal half of tibiæ and calcariæ, fulvous-red; 3rd and 4th joints of hind tarsi white. Tegulæ and stigma dark brown; wings slightly yellowish. Male. Length, 8—10 mm.

I took these males on Mousehold, near Norwich, on October 3rd, 1881. They come very near *P. perspicillator* and *arrogans*, but differ from *perspicillator* in having the apex of the abdomen black. In this respect it is like *arrogans*, but differs from this latter in having a pale spot in the middle of the face, and orbits black, and only the 3rd and 4th joints of the hind tarsi white.

These two species Prof. Thomson first placed in his subgenus *Plectocryptus* (Opus. Ent., 599), and afterwards in *Microcryptus* (*l. c.*, 850), the former having large oval metathoracic spiracles, and the latter small circular

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ones; but one division of the latter subgenus is given with large spiracles, and into this these two species are placed.

Phygadeuon (*Microcryptus*, Th.) *rufoniger*, n. s.

Niger; abdominis basi et pedibus rufis, posticis femorum et tibiarum apice fuscis, antennis tricoloribus.

Head and thorax somewhat shining, punctate. Head behind the eyes not narrow, almost narrower than the thorax, slightly concave behind; antennæ rather more than half the length of the body, almost filiform; 1st joint of the flagellum about three times longer than wide; 6th quadrate; metathorax somewhat rugulose, with three superior areæ; supero-medial area small, about as broad as long, narrower in front than behind; lateral areæ not divided, the transverse ridge deeply concave in the middle; spiracles small, almost circular. Abdomen elongate-ovate, as wide as the thorax, smooth and shining; 1st segment without prominent keels; remaining segments transverse; 2nd and 3rd of equal lengths, the 3rd the widest; aculeus about one-third the length of the abdomen. Legs rather slender. Areolet of wings pentagonal, outer nervure more or less incomplete; posterior-inferior angle of discoidal cell rectangular; transverse anal nervure of hind wings scarcely anti-furcal, divided below the middle.

Black; flagellum tricoloured; joints 1—3 red, 4 and 5 fuscous, 6—9 white, the 6th and 9th partly brown, remainder black; 1st to 3rd segments of the abdomen red, and also the 4th laterally at the base obscurely so, remainder black; apex not white-marked. Legs red; the hind ones have the tarsi and apex of femora and tibiæ fuscous. Stigma and tegulæ fuscous. Wings fusco-hyaline. Female. Length, 5 mm.

Several females were taken by Mr. Billups in Ashdown Forest on November 10th, 1885, I suppose dug up from the roots of grass, &c.

It is very like *P. improbus*, Tasch., but has shorter antennæ and aculeus, thinner legs, and no white on the apex of the abdomen.

Leptocryptus, Th. (*Hemiteles*, Gr.) *ruficaudatus*, m.

In the 'Transactions' of this Society for 1883, p. 149, I described the female of this insect. It appears to be not uncommon: I have taken it in the neighbourhood of Norwich, and have seen it from other collectors. The

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Rev. T. A. Marshall on one occasion took both sexes in great numbers. The male differs only from the female in the colour of the legs; the hind coxæ are more or less dark, generally dark, apex pale, trochanters pale, hind femora, tibiæ, and tarsi darkish brown, extreme base of femora pale; the middle segments of the abdomen have sometimes dark blotches on the sides. The male is very like the male of *H. fragilis*, Gr. (this Thomson says is also *Leptocryptus*, Th.), but differs in having the hind tibiæ uniformly coloured; the face is almost smooth, with scarcely any pubescence, and converges towards the mouth, the parapsides only extending to just beyond the middle of the mesonotum. In *Leptocryptus fragilis* the middle of the hind tibiæ is red, face densely pubescent and not converging, the parapsides more deeply impressed and extending almost to the foveæ in front of the scutellum.

Hemiteles nitidus, n. s.

Niger; abdominis medio pedibusque rufis, aculeo abdominis dimidio longiore.

Shining, smooth; mesothorax very finely punctate; 1st segment of abdomen very finely aciculate. Head transverse, slightly narrow behind the eyes, viewed in front triangular; apex of clypeus somewhat truncate; face finely punctate; a deep fovea above the antennæ, these about three-fourths the length of the body, almost filiform, slightly thickened before the apex; the first three joints of the flagellum about the same length, nearly three times as long as wide; parapsides of mesonotum distinct; metathorax with distinct areæ; supero-medial subtriangular, quite as long as wide or a little longer; basal area transverse, triangular, apex terminating laterally in a short obtuse spine. Abdomen elongate-ovate; apex of the 2nd segment the widest; apex somewhat compressed; 1st segment twice as long as the width of the apex, this three times as wide as the base; 2nd segment rather wider than long, and a little wider than the thorax; aculeus slightly more than half the length of the abdomen, slightly curved downwards. Legs moderate. Areolet of wings pentagonal, with outer nervure absent; posterior-inferior angle of discoidal cell acute; transverse anal nervure ante-furcal, divided one-third from the bottom.

Black. Legs red; greater part of hind trochanters black; tarsi partly pale fuscous. Abdomen: apex of 1st segment, 2nd entirely,

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and 3rd red, except the black apex and sides; margin of apical segments membranaceous. Stigma black; tegulæ pale piceous. Female. Length, 5 mm.

One female was bred by Mr. W. H. B. Fletcher from cocoon found at Chesil Beach, April 24th, 1884.

It is very like *H. ridibundus*, Gr., but the head and thorax are smoother and more shining, the coxæ are red, and the stigma has not a white base.

Hemiteles longicauda, Thom.

Thom., Opus. Ent., fasc. x., 980.

I detected a female of this species among a lot sent to me to name by Mr. C. W. Dale. The card on which it was fixed bore no locality. The legs were almost entirely red; 1st segment of the abdomen and part of the 2nd were red.

Apterophygus (Fst.) ? *paradoxus*, n. s.

Thorax with rudimentary wings, the upper face of the metathorax as long as the posterior face, with moderately distinct areæ; abdomen ovate; the 2nd segment narrow at the base, the width of the apex equal to the length; the 3rd almost longer than the width of the base, apex narrower than the base; remainder transverse; aculeus very short, only just projecting. This genus is very near to *Cremnodes*, but the metathorax is of a different shape, the 1st segment of the abdomen is broader, the 2nd narrower at the apex. It differs from Foester's description of his genus, which is very short and as follows:—"Metanotum not slanting from the base; the 1st joint of the flagellum not longer than the 2nd." In Mr. Marshall's insect the 1st joint is longer than the 2nd. It seems a connecting-link between *Cremnodes* and *Apterophygus*, having the antennæ as in the former, and metanotum as in the latter.

Shining; head almost cubical, smooth; antennæ subclavate, about three-fourths the length of the body, with 20 joints; 1st joint of the flagellum about twice as long as wide, the 2nd about one-fourth shorter than the 1st, the 5th quadrate. Thorax one-third longer than high, narrower than the head, depressed; mesonotum smooth, parapsides only present in front; wings rudimentary, scarcely extending beyond the base of the scutellum, which is smooth; metanotum with regular areæ; supero-medial pentagonal, as broad as long; lateral areæ divided, terminated

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laterally by a slight obtuse projection. Abdomen as wide as the head; 1st segment somewhat narrow, curved, gradually increasing in width from base to apex, not quite three times as long as the width of the apex; spiracles placed just behind the middle, this and the 2nd segment with faint indications of reticulation; the remainder smooth; the second segment about as long as the width of the apex, narrow at the base, sides almost straight; 3rd as long as wide, narrower at the apex than at the base; remaining segments transverse; abdomen at the sides with fine rather scattered pubescence. Legs moderate.

Black; scape beneath and apex of 1st joint of flagellum reddish. Legs dull red, base of hind coxæ and middle of hind femora piceous, middle and hind tarsi piceous; 2nd segment of abdomen castaneous; 3rd segment black, base castaneous. Female. Length, 3 mm.

One female was taken by the Rev. T. A. Marshall at Nunton.

Pezomachus pulicarius, Gr.

♂. Niger, segmentis 1, 2, 3 rufo-marginatis.

Subopaque, finely granulate; head rather stout, slightly contracted behind the eyes, rather wider than the thorax; antennæ as long as the body; 1st joint of the flagellum about four times as long as wide, longer than the 2nd; clypeus somewhat distinctly separated from the face, rounded at the apex; space between the eyes and the mandibles about equal to the width of the base of the latter; face transverse, rather prominent in the middle. Thorax longer than high; parapsides faintly impressed in front; scutellum somewhat gibbose, suture at the base finely consute; metathorax a little longer than wide, with only a faintly defined supero-medial area, which is about as broad as long; the superior surface separated from the posterior by an angulated costa, which permits the postero-medial area to run almost half-way up the superior surface. Abdomen elongate-ovate; 1st segment rather narrow, without projecting spiracles, only about one-fourth narrower at the base than at the apex, sides more parallel, and the base wider than usual; 2nd segment about as long as wide; remainder transverse; apex of the 3rd the widest part, this is as wide as the thorax. Legs slender. Wings with a pentagonal areolet; outer nervure absent; the cubital nervure with one and the recurrent nervure with two clear spots; stigma triangular, about one-third longer than wide; radial cell rather short, outer nervure slightly curved, exterior-inferior angle of discoidal rectangular; transverse anal

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nervure of lower wing ante-furcal, distinctly divided one-third from the bottom.

Black; apex of 1st segment and base of 3rd narrowly yellowish red, the 2nd yellowish red, with a large black central blotch leaving only a narrow pale border all round the segment. Legs black; base of front tibiæ and joints of tarsi piceous; middle and hind legs, apex of trochanters, base of tibiæ, and base of joints of tarsi, piceous. Squamulæ and nervures blackish brown. Stigma black, white at the base. Wings slightly fuscous, with a white patch just in front of the stigma.

This male, together with the female, were sent to me by Mr. G. C. Bignell for identification, having been bred by Mr. B. A. Bower from *Coleophora vibicella*.

? *Ophion longigena*, Thom.

Thom., Opus. Ent., 1191, 2.

This species, as well as the next, is most likely mixed up in our collections with *O. luteus*, Gr., but the head is not at all narrowed behind the eyes, and ocelli are far removed from the eyes; it has a head the shape of *Paniscus cephalotes*, Holm., and, in the specimen I have seen, quite free from any yellow marks. It was bred by Mr. Bignell from *Cucullia scrophulariæ*, June 11th, 1888.

The descriptions of Prof. Thomson are generally too short to be able to identify species with certainty.

? *Ophion distans*, Thom.

Thom., Opus. Ent., 1191, 3.

I have a female of this species, given to me by Mr. W. J. Cross, of Ely. The cocoon is pale uniform brown: the host is unknown. It differs from *luteus* in having the face wider, cheeks longer, and head more dilated behind the eyes, and the ocelli do not touch the eyes. Bred also by Mr. Bignell from *Dianthœcia irregularis*.

Parabatus nigricarpus, Thom.

Thom., Opus. Ent., 1196, 1, ♀.

I have a female, given to me by Mr. E. A. Atmore, which I believe to be this species. It differs slightly

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from Thomson's description in two points: the abdomen is not dark at the base, and the abdomen is not very much compressed at the apex. *Parabatus* is one of Foerster's genera which Thomson defines as differing from *Paniscus* in having the transverse ordinary nervure interstitial, and the head behind not bordered by a ridge: *virgatus*, Gr., and *tarsatus*, Brischke, belong to it; *nigricarpus* has the outer nervure of the areolet imperfect.

Parabatus cristatus, Thom.

Thom., Opus. Ent., 1197, 4, ♂ ♀.

Mr. W. H. B. Fletcher has bred a female, host unknown, from Stornoway.

Campoplex lapponicus, Holm.

Holm., Mon. Oph. Suec., 37, 8, ♂ ♀; Scand. Art. Af. Oph. Camp., 51.

Mr. W. H. B. Fletcher has bred this from *Melanippe hastata* from Stornoway.

Holmgren says that the hind tibiæ are more frequently red in the middle. Mr. Fletcher bred two females and five males, but all have the hind tibiæ entirely dark. The black streak at the base of the sides of the 3rd segment is absent in both the females, sometimes present and sometimes absent in the males. The cocoons are palish brown, sometimes ashy and uniform in tint. This species is very distinct; the 3rd segment convex below, black legs, and aculeus about as long as the 1st segment easily separate it.

Campoplex incompletus, n. s.

Abdominis medio rufo, pedibus posticis nigris, stigmate nigro-fusco.

This insect has the metathorax entirely free from areæ, and comes next to *C. fatigator*, Fst., and *C. Tschekii*, Holm., but may readily be distinguished from these by the dark stigma, the two latter having the stigma yellowish.

Head transverse, sides behind the eyes almost parallel, forehead without keel or furrow. Thorax opaque; mesonotum closely

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punctated, interstices reticulate; scutellum keeled at the sides as far as the middle, with punctures larger and more scattered than on the mesonotum; mesopleuræ opaque, densely punctate, without a crest behind the front coxæ; metathorax opaque, finely rugose, central furrow not deep, without a trace of areæ, with rather dense white pubescence at the sides. Spiracles of 1st segment of abdomen not prominent, petiole gradually sloping into the post-petiole, which has slightly rounded sides, and is about twice as wide as the petiole; 2nd segment about one-fourth longer than the 3rd, lower margin of the latter convex. Areolet of wings petiolated; recurrent nervure received just beyond the middle; the 1st division of the radius of hind wing a little longer than the transverse cubital; transverse anal nervure not divided.

Black; palpi fuscous. Apex of 2nd abdominal segment, the 3rd and 4th, entirely red. Front legs yellowish red, coxæ black, trochanters fuscous; middle legs black; apex of femora and tibiæ entirely yellowish red; hind legs black. Tegulæ black, stigma nigro-fuscous. Male. Length, 8 mm.

One male was taken by Mr. T. R. Billups at Eastbourne, June 6th, 1888, who very kindly gave it to me.

Sagaritis incisa, m.

Mr. Fletcher has bred both sexes of this insect from *Eupithecia campanulata* from Sussex, and I find that the transverse incision on the 2nd segment varies, and is sometimes altogether absent. The male is like the female, but has the trochanters showing a little more yellow; the middle of the mandibles of both sexes is yellow, and sometimes there is a pellucid transverse streak at the side of the 2nd and 3rd segments, sometimes on the 2nd segment only.

Casinaria morionella, Holm.

Holm., Mon. Oph. Suec., 48, 2, ♂ ♀.

Mr. W. H. B. Fletcher has bred two specimens from *Eupithecia expallidata*, taken in Abbott's Wood.

Casinaria claviventris, Holm.

L. c., 49, 3, ♂ ♀.

Bred by Mr. G. T. Porritt from *Scodiona belgiaria*.

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Limneria (*Omorga*, Thom.) *fasciata*, n. s.

Niger, scapo subtus pallide, segmento secundo rufo-marginato, pedibus anterioribus rufis, posticis nigris, tibiis rufis apice et ante basin fuscis, aculeo abdominis dimidio paulo breviore.

Scarcely shining; head transverse, slightly rounded behind the eyes; antennæ a little shorter than the body, filiform, scarcely attenuated at the apex; teeth of mandibles equal length; apex of clypeus rounded; face rather longer than wide, sericeous, a little wider than the forehead; eyes against the antennæ, not at all indented. Mesonotum very finely punctate; costæ of metathorax very prominent; supero-medial area pentagonal, about as long as wide, sides parallel, often obtuse in front, not closed behind; postero-medial area with rather faint transverse rugæ, lateral areæ subdivided; metathorax rather shining. Mesopleura finely punctate below, striate above in front, smooth and shining behind. First segment of abdomen almost straight; post-petiole longer than wide, sides slightly rounded in the female, scarcely so in the male, longer and wider than the petiole, this and the rest of the abdomen rather shining; 2nd segment almost one-third longer than wide; remainder transverse; aculeus rather more than one-third the length of the abdomen. Legs moderate. Stigma rather narrow; wings with a petiolated areolet; recurrent nervure received beyond the middle, inferior-posterior angle of discoidal cell acute, transverse anal ante-furcal, slightly geniculated nearly at the bottom, emitting nervure very indistinct.

Black; scape beneath, mandibles, and palpi pale, varying from reddish yellow to piceous; tegulæ, base of wings, and a spot beneath, stramineous; stigma fusco-testaceous; extreme apex of 2nd segment of abdomen more or less obscure red, generally distinct but narrow, sometimes obsolete, ventral fold stramineous. Front legs red, intermediate ones red; coxæ black, apex sometimes reddish; trochanters fuscous-marked; femora more or less black at the base; hind legs, coxæ, and trochanters black, the latter reddish at the apex; hind femora varies from almost red to entirely blackish brown (the latter appears to be the commonest form); base and apex of tibiæ fuscous, middle and sometimes slightly at the extreme base brownish red; tarsi fuscous, extreme base paler; in the male the front and middle coxæ beneath are marked with yellow, and in one specimen entirely yellow. Male and female. Length, about 5 mm.

Bred by Mr. W. H. B. Fletcher from *Trycheris aurana* from Steyning, and *Psyche intermediella*, and also from

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either *Hysipetes ruberata* or *Grapholitha campoliliana* from Stornoway.

This species appears to me to belong to Section A. a a. of *Omorga*, Thom. ('Opuscula entomologica,' p. 1128), and differs from the only one there described in the red margin of 2nd segment; the length of the aculeus is not given by Thomson.

Limneria (*Omorga*, Thom.) *submarginata*, n. s.

Niger, pedibus rufis, basi nigris, aculeo abdominis dimidio longitudine.

Subopaque; head transverse, behind the eyes sides almost straight; antennæ about two-thirds the length of the body, slightly attenuated at the apex, rather stout; face quadrate; teeth of mandibles subequal. Thorax opaque; metanotum scarcely shining, rather smooth; costæ very distinct; supero-medial area pentagonal; sides parallel, rather longer than broad, not closed behind; lateral areæ subdivided; postero-medial scarcely concave, obsoletely transversely rugose; mesopleura somewhat shining, speculum smooth and shining, very finely punctate. Abdomen of the female about as wide as the thorax, narrower in the male, the first two or three segments subopaque, with apical margins shining; remainder shining, especially so at the apical margins; first segment almost straight, post-petiole longer than wide, and longer than the petiole; 2nd segment of the female a little longer than wide, of the male one-third longer than wide; the 3rd and remaining segments of the female transverse, the 3rd of the male subquadrate; remainder transverse. Aculeus half the length of the abdomen, slightly curved. Legs tolerably slender. Wings with an areolet, petiolated; posterior-inferior angle of discoidal cell hardly rectangular; transverse anal nervure feebly geniculated; emitting nervure obsolete.

Black; palpi brownish red. Legs red, coxæ black; trochanters black, apex narrowly pale; extreme base of all the femora black; hind tibiæ, apex, and before the base fuscous, paler in the female than in the male; tarsi fuscous, base pale, only slightly so in the hind pair. Apical margin of posterior segments of the abdomen obscurely piceous, ventral fold yellow. Tegulæ black; stigma fusco-testaceous; base of wings stramineous. Male and female. Length, 5·5 mm.

This comes very near to *L. faunus*, if it is not a var. of that species; but Mr. Fletcher has bred three females

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and two males (from *Eupithecia pygmæata*, from Cambridgeshire), and there is no variation; the scape beneath is black, and the hind tibiæ have two fuscous rings; the tegulæ and mandibles are black, not yellow.

Limneria (*Angitia*, Th.) *annulipes*, n. s.

Niger, pedibus posticis nigris, tibiis basi et medio albidis, aculeo subexserto; areola nulla.

Slightly shining; head somewhat narrow behind the eyes, wider than the thorax; face subquadrate, covered with white pubescence; apex of clypeus rounded; cheeks not buccated; antennæ filiform, scarcely attenuated at the apex, somewhat shorter than the body. Thorax rather long; metathorax somewhat smooth and shining, with five distinct superior areæ; supero-medial area pentagonal, longer than wide, distinctly closed behind. Abdomen slender, as long as and narrower than the head and thorax. Post-petiole of abdomen subglobose, about one-third wider than the petiole; remaining segments of about equal width; the 2nd one-third longer than wide, and as long as the 1st segment, these scabriculous; remainder smoother; the 3rd subquadrate; aculeus only just projecting. Wings without an areolet; external radial nervure curved; transverse anal nervure of hind wings not divided.

Black; palpi and mandibles yellow, teeth of the latter reddish; coxæ black, trochanters yellowish white, basal joint of hind pair black; front and middle femora, tibiæ, and tarsi yellowish red, the latter more or less fuscous at the extreme apex; hind femora black; hind tibiæ whitish, apex and before the base black; tarsi black, extreme base pale. Tegulæ yellow; stigma substramineous. Male and female. Length, about 3·5 mm.

A single female was bred by Mr. E. A. Atmore from *Bucculatrix cidariella*. This comes very near *L. Elishæ*, m., but differs in having the 2nd and 3rd segments of the abdomen longer, and aculeus shorter and stigma paler. It is also, from the description in E. M. M., xii., 194, very like *L. croceipes*, Marshall. This comes next to *L. Elishæ* in Opus. Ent., p. 1165.

One male was bred by Mr. W. H. B. Fletcher from *Bucculatrix cidariella*.

This insect is very like *L. transfuga*, Gr., but the stigma is broader and shorter, as well as the radial cell; the posterior-inferior angle of *transfuga* is decidedly

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acute, the supero-medial area of metathorax has almost parallel sides, and the post-petiole is shining; while the other has the sides of the supero-medial area converging, and post-petiole opaque. Thomson has placed *L. transfuga* in the genus *Nemeritis*, but Holmgren, who made the two genera *Limneria* and *Nemeritis*, has placed it in the former.

Limneria (*Angitia*, Th.) *crassa*, n. s.

Abdominis medio rufo-maculato, pedibus pallidis, coxis posticis nigris, scapo antennarum flavo, areola nulla, aculeo segmento primo breviore.

Subopaque, finely punctate; antennæ slightly attenuate at the apex; female about three-fourths the length of the body, as long as the body in the male; head transverse, scarcely narrowed behind the eyes; face quadrate, covered with fine white pubescence; forehead rather wider than the face; eyes slightly emarginate against the antennæ; apex of clypeus widely rotundate; teeth of mandibles subequal. Thorax longer than high; supero-medial area of metathorax pentagonal, about as long as wide or rather longer; lateral areæ imperfectly subdivided. Abdomen somewhat compressed; 1st segment rather stout, post-petiole subquadrate, rather longer than wide, petiole a little longer than the post-petiole, and rather more than half the width of the post-petiole; 2nd segment of the female rather longer than wide, 3rd transverse; these segments are longer in the male; the 3rd quadrate; aculeus about two-thirds the length of the 1st segment, or about one-seventh the length of the abdomen. Legs moderate. Wings without an areolet; external radial curved; transverse anal of hind wings not divided.

♀. Black; palpi, mandibles, and scape yellow, the latter fuscous above; antennæ fuscous, yellowish at the base beneath; coxæ of front and middle legs yellow, the latter slightly fuscous at the base; hind coxæ black; all the trochanters yellow; femora, tibiæ, and tarsi pale yellowish red; hind tibiæ paler; apex and before the base and articulations of hind tarsi pale fuscous, as well as extreme apex of front and middle tarsi. Second segment of abdomen red, fuscous on the back; 3rd red at the sides; the 4th slightly so. Tegulæ yellow; stigma pale.

♂. Differs only from the female in having the scape entirely yellow, and a red spot on the side of the abdomen extending from the apex of the 2nd almost to the apex of the 3rd segment. Male and female. Length, about 8 mm.

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A male and female were bred by Mr. W. H. B. Fletcher from larvæ of *Bucculatrix cidariella* taken in Abbott's Wood.

This is not unlike *Meloboris pusio*, H., which Thomson has placed in *Angitia*. It differs in the colour of the scape and front and middle coxæ; the 1st segment of the abdomen is stouter than usual in the genus *Limneria*. It would come after No. 43, p. 1165, of Thomson's Opus. Ent.

Limneria (*Angitia*, Th.) *scotiæ*, n. s.

Niger, pedibus posticis nigris, tibiis posticis basi et medio albidis, aculeo segmento primo breviore.

Head subopaque, finely reticulate, behind the eyes scarcely narrow; face with fine white pubescence, subquadrate, or a little longer than wide; antennæ filiform, in the male about three-fourths the length of the body, shorter in the female. Thorax subopaque, finely punctate; metathorax rather shining, finely reticulate, with a few irregular short transverse costæ; superomedial area almost triangular, wide, not closed behind; lateral areæ not subdivided. Abdomen rather shining; petiole of 1st segment about half the width of or a little less and rather longer than the post-petiole, which is rather longer than wide, sides parallel; 2nd segment one-fourth longer than wide; 3rd subquadrate, or a little wider than long; remainder transverse, laterally subcompressed; aculeus about one-fifth the length of the abdomen, shorter than the 1st segment. Stigma not more than three times as long as its greatest width; external radial nervure very much curved, areolet petiolated; recurrent nervure received behind the middle; transverse anal nervure of hind wings not divided.

Black; palpi and mandibles yellow, teeth of latter dark; coxæ black, extreme apex of front pair of male yellow, front trochanters yellow, middle pair of male yellow, base black; female black, apex yellowish, hind pair black, apex yellowish; front femora yellowish red, middle pair stained with brown at the base and behind, hind pair black; tibiæ yellowish white, hind pair, apex, and before the base dark; front and middle tarsi pale, apex fuscous, hind pair fuscous, base pale; tegulæ yellow; stigma sordid stramineous; ventral fold dark. Male and female. Length, 4 mm.

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Bred by Mr. W. H. B. Fletcher from *Heydenia auromaculella* from Shetland.

This comes very near to *L. lugubrina*, H., but differs from his description in the length of the aculeus, the 2nd and 3rd segments of the abdomen, colour of the stigma, and areæ of the metathorax.

Limneria (*Angitia*, Th.) *albonotata*, n. s.

Niger, pedibus anticis flavo-testaceis, coxis et trochanteribus pallide stramineis, posticis coxis nigris, femoribus rufis, tibiis albis, basi apiceque nigris, tarsis nigris, basi albis; aculeo brevissimo.

Head transverse, wider than the thorax, narrowed behind the eyes, seen in front, subtriangular; apex of clypeus rotundate; mandibles rather stout, teeth equal; face longer than wide, rather narrower than the forehead; antennæ rather shorter than the body, attenuated at the apex; eyes slightly emarginate against the antennæ. Thorax opaque, longer than high; metathorax with three indistinct superior areæ; the lateral areæ with hardly an indication of the transverse costa; supero-medial area elongate, narrow, finely rugose, posterior face rather more coarsely rugose, not depressed in the centre. Abdomen longer and narrower than the head and thorax; 1st segment almost straight, post-petiole about twice as wide as the petiole, longer than wide, sides almost straight; 2nd segment about one-third longer than wide; 3rd subquadrate; remainder transverse; aculeus of female very short. Legs slender. Wings with a petiolated areolet; recurrent nervure received almost at the apex; radial nervure almost straight, curved at the apex; transverse anal of hind wings not divided. Stigma very narrow.

Black; mandibles pale stramineous; front and middle legs reddish yellow; coxæ and trochanters pale stramineous; hind legs: coxæ black, trochanters pale, base black, femora red, tibiæ white, base and apex black, calcariæ white, more than half the length of the metatarsi, tarsi black, base of 1st joint widely white, ventral fold partly pale fuscous. Tegulæ pale stramineous; stigma piceous. Male and female. Length, 8 mm.

These insects were taken by Dr. Capron in the neighbourhood of Shiere, and are very like *L. interrupta*, H., but are much larger, and the base of the hind tarsi is white. They belong to the genus *Limneria* of Holmgren, and *Angitia* of Thomson.

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Limneria (*Angitia*, Th.) *aculeata*, n. s.

Niger, pedibus rufis, coxis nigris, tibiis posticis apice et ante basin fusco-notatis, tarsis posticis apice fuscis, aculeo dimidio abdominis longiore.

Head subopaque, transverse, sides behind the eyes slightly slanting; face subquadrate, punctate, narrower than the forehead, slightly emarginate against the eyes; clypeus separated from the face by a shallow groove, apex rounded; mandibles moderate, teeth equal; head, seen in front, subtriangular; antennæ about half the length of the body, attenuated at the apex. Thorax longer than high, rather shining; mesonotum punctate, interstices not reticulate; metathorax smooth, shining, with hardly any sculpture, rounded, with five superior areæ; supero-medial pentagonal, about as long as broad or scarcely so; mesopleura shining, punctate; disc smooth and shining. Abdomen longer than the head and thorax, and about as wide as the latter, smooth and shining; petiole about or very little longer than the post-petiole, this stout, with almost straight sides, and rather more than twice as wide as the petiole; 2nd segment about one-third longer than wide; 3rd slightly transverse; 6th and 7th deeply notched above; aculeus quite two-thirds the length of the abdomen, curving upwards. Legs rather slender. Wings with a subsessile or subpetiolated areolet; recurrent nervure received almost in the middle; external radial nervure almost straight; stigma not narrow; transverse anal not divided.

Black; palpi testaceous; apex of mandibles reddish; legs red, coxæ and base of front trochanters black, hind trochanters black, extreme apex red; tibiæ pale whitish yellow above, apex and before the base of the hind ones above pale reddish brown; calcariæ pale, rather more than half the length of the metatarsi; hind tarsi fuscous; 1st joint almost entirely pale reddish yellow, base of remaining joints slightly so; claws with two or three rather coarse teeth at the base (pectinated). Nervures black; stigma yellow testaceous; tegulæ whitish yellow. Female. Length, 7 mm.

Two females were bred by Mr. W. H. B. Fletcher from *Lycæna alsus*, August, 1883. It is easily distinguished by the long aculeus, the 6th and 7th dorsal segments of the abdomen being deeply notched, and the colour of the legs.

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Limneria (*Anilasta*, Th.) *teucrii*, n. s.

Segmentis mediis rufo-cingulatis, pedibus rufis basi nigris, tibiis albicis, posticis apice et ante basin nigris, tarsis fuscis basi pallidis.

Head transverse, slightly narrowed behind the eyes; antennæ of male about as long as the body, female about three-quarters, almost filiform, slightly thickened in the middle; face subquadrate, a little narrower than the forehead, covered with fine white pubescence. Thorax longer than high, opaque, finely punctured; mesopleura dull, punctate below, striate in front of disc, which is rather smooth but not shining; metathorax with three superior areæ; supero-medial area pentagonal, as long as broad, sometimes almost triangular, sometimes the lateral areæ are imperfectly subdivided; postero-medial area somewhat shining, transversely rugose. Abdomen longer and narrower than the head and thorax; 1st segment slightly curved, post-petiole longer than wide, sides almost parallel; 2nd segment of female a little longer than wide, of male one-third longer than wide; 3rd segment of female almost quadrate, of male longer than wide; remainder transverse; aculeus of female about one-sixth the length of the abdomen. Wings with an areolet; recurrent nervure received sometimes before and sometimes behind the middle; external radial slightly curved; transverse anal nervure not divided. Legs moderate; claws of hind tarsi distinctly pectinated at the base.

Black; mandibles, palpi, and scape beneath yellow; 2nd segment of abdomen towards the apex chestnut, extreme apex black; 3rd segment chestnut, apex broadly and base narrowly black; apex of 1st segment of the female obscurely red; the red on the male is often very obscure. Front legs reddish yellow, coxæ black, trochanters yellowish; middle and hind coxæ black; middle trochanters yellowish, more or less black at the base; hind trochanters black, extreme apex pale; femora red; tibiæ and tarsi yellowish white; middle tibiæ brownish at the apex; hind tibiæ, apex, and before the base above fuscous, apex reddish beneath; apex of tarsal joints fuscous, apical joints almost entirely fuscous. Ventral fold of abdomen yellowish, stained with brown. Stigma fuscous, slightly paler at the base; tegulæ yellowish white. Male and female. Length, 5·5 mm.

Bred by Mr. W. H. B. Fletcher and Mr. Bignell from *Pterophorus teucrii*; its transformation takes place in the inflated skin of that larva, or it makes but a very slight transparent cocoon within it.

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It is very like *L. tricincta*, Gr., but the hind tibiæ is differently coloured, and the front coxæ are not pale.

Since the above was written, Mr. Fletcher has bred, from *Pterophorus baliodactylus*, an *Anilasta* which differs from the above in having the scape black beneath. This is probably only a variety.

Cremastus decoratus; Gr.

Grav., I. E., iii., 734, 151, ♂ ♀; Holm., Mon. Oph. Suec., 107, 1, ♂ ♀.

Bred by Mr. W. H. B. Fletcher from *Depressaria badiella* from Shoreham, August, 1887.

Thersilochus nitidus, n. s.

Niger, nitidus, pedibus pallidis, aculeo dimidio abdominis longitudine.

This very small insect might almost form a separate genus: the 1st segment of the abdomen is shorter and thicker than usual.

Shining; head transverse, wider than the thorax, behind the eyes subdilated; antennæ about three-fourths the length of the body; flagellum subclavate, with 14 joints; 1st joint one and a-half longer than wide, about one-fourth shorter than the 2nd; all the joints longer than wide. Mesonotum obsoletely punctate, shining; metathorax without any trace of area. Abdomen scarcely so long as the head and thorax; 1st segment short, about two and a-half times as long as wide, almost straight, rather narrower at the base than at the apex, spiracles distinct, about in the centre; 2nd segment transverse, as wide at the apex as the thorax; apical segments slightly compressed; aculeus scarcely longer than the 1st segment, slightly curved. Legs somewhat slender. Wings: external radial curved.

Brownish black; scape of antennæ and part of basal joints of flagellum and legs fulvous; stigma and nervures palish brown; squamulæ black. Female. Length, 1·5 mm.

One female, taken by the Rev. T. A. Marshall.

Thersilochus carinatus, n. s.

Niger, abdomine pedibusque maxima ex parte rufis, aculeo abdominis dimidio longitudine.

Head and thorax subopaque; head transverse, narrow behind

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the eyes; antennæ about two-thirds the length of the body, 28 joints; three first joints of the flagellum of equal length, about one-half longer than wide, joints not distinctly separated. Metathorax with a distinct longitudinal keel on the superior surface. First segment of abdomen slightly curved, almost straight, post-petiole gradually sloping from the petiole and but little wider; remainder subcompressed; 2nd segment longer than wide; aculeus nearly one-half the length of the abdomen.

Black; legs red, coxæ black, trochanters brownish. Abdomen red; 1st segment black; back of remainder scarcely fuscous-stained. Stigma and squamulæ piceous. Female. Length, 4 mm.

A single female, taken at Norwich, July, 1880. Somewhat like *jocator*, but metathorax with a central keel.

Thersilochus minutus, m.

Niger; tibiis rufis, aculeo abdominis longitudine.

Head and thorax subopaque; head wider than thorax, rather stout, sides scarcely slanting behind the eyes; antennæ of female about as long as the head and thorax with 12 joints, the male a little longer with 16 joints; first three joints of flagellum of female of about equal length, quite twice as long as wide; 1st joint in the male the same length; the remainder submoniliform. Superomedial area of metathorax longer than wide, narrower behind than in front. Abdomen compressed, shining; 1st segment curved towards the apex, post-petiole one-half wider than the petiole; aculeus as long as the abdomen.

Black; front and middle femora reddish, black at the base; extreme apex of hind femora red; tibiæ reddish, slightly fuscous towards the apex; front tarsi red. Male and female. Length, 2·5 mm.

Taken by Dr. Capron at Shiere.

Thersilochus flavicornis, Thom.

Thom., Opus. Ent., 1391.

I bred one male from the galls of *Nematus gallicola*, and took another in the same neighbourhood (near Norwich) the galls came from.

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Holomeristus tenuicinctus, Fst.

Fst., Ueb. d. Gatt. u. Art. d. Fam. d. Plect., 80, ♀.

Dr. Capron has taken this in the neighbourhood of Shiere in 1887.

? *Plectiscus tener*, Fst.

L. c., 86, ♀.

Dr. Capron has taken a *Plectiscus* (male and female), which agrees very well with Förster's description of *P. tener;* but as his description is only "2nd segment smooth, aculeus not longer than the abdomen, body not entirely yellow, prothorax at the sides not entirely red-yellow, antennæ with 19 joints, 1st segment of abdomen with projecting tubercles," it is quite impossible to say with certainty that this is the above species.

Plectiscus canaliculatus, Fst.

L. c., 87.

Last year I sent my insects of the *Plectiscus* group to Prof. C. G. Thomson, and on their return I found what I considered *P. zonatus*, Gr., Prof. Thomson had named *P. canaliculatus*, Fst. The insect agrees very well with Gravenhorst's species, which Förster did not know: his description of *P. canaliculatus* differs only from *P. tener*, F., in the "1st segment of abdomen without projecting tubercles."

Mesoleptus glacialis, Wolds.

Wolds., Bidr. t. känn. af. Finl. Tryph., 1874, 33, ♀.

Two specimens were taken by the Rev. T. A. Marshall near Abergavenny.

Perilissus fumatus, m.

Entom., xiii., 54.

I believe this is *Tryphon scotopterus*, Gr.

Perilissus lutescens, Gr.

Holm., Mon. Try. Suec., 125, 9, ♂ ♀.

Mr. Bignell has taken a male at Bickleigh, near Plymouth, May 3rd, 1886.

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Perilissus erythrocephalus, Gr.

Grav., I. E., ii., 220, ♂.

I found a specimen in a box of ichneumons, mostly very old, sent to me to name by Mr. Dale; it has no date or locality with it.

Thymarus compressus, Thom.

Thom., Opus. Ent., fasc. ix., 909, ♂ ♀.

Dr. Capron has taken this species in the neighbourhood of Shiere.

Mesoleius facialis, Gr.

Mesoleptus facialis, Gr., Ich. Europ., ii., 12, 4, ♂.

This species has been taken both by Dr. Capron in the neighbourhood of Shiere and also by Mr. Billups.

Adelognathus dorsalis, Gr.

Hemiteles dorsalis, Grav., Ich. Eur., ii., 838, 266, ♂ ♀.
Adelognathus dorsalis, Thom., Opus. Ent., ix., 880, 12; *l. c.*, xii., 1278, 19.

Dr. Capron has taken a female and several males in the neighbourhood of Shiere.

Polyblastus unicinctus, n. s.

Niger, pedibus anticis ex parte rufis; segmento secundo cas taneo.

Smooth and shining; head and thorax with fine white pubescence. Head subquadrate, a little wider than the thorax; antennæ about as long as the body. Thorax about as long as high; parapsides scarcely impressed; scutellum not elevated; mesonotum and scutellum much higher than the metanotum, this short with three superior areæ. Abdomen elongate-ovate; apex of 3rd segment the widest, apex more acutely pointed than usual; 1st segment about twice as long as the width of the apex, this about one-half wider than the base, spiracles slightly projecting at the base of the segment, subcanaliculated; 2nd segment transverse, gastrocœli more deeply impressed than usual; remaining segments transverse; aculeus projecting, straight, and moderately stout. Wings with an almost sessile areolet; recurrent nervure received just before the apex; external radial nervure straight; transverse anal

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of hind wings divided just below the middle. Legs slender; basal half of tarsi distinctly pectinated.

Black; mandibles yellow. Legs: coxæ black, trochanters black, front ones brownish at the apex, front and middle femora red, slightly fuscous at the base, front tibiæ and tarsi yellowish red, middle tarsi somewhat fuscous, hind legs entirely black. Second segment of abdomen castaneous. Squamulæ and stigma dark brown, the latter slightly paler at the apex. Female. Length, 7 mm.

Taken by the Rev. T. A. Marshall in S. Devon.

This species is very distinct, and may easily be recognised by the colour of the hind legs and abdomen.

Cteniscus jucundus, Holm.

Holm., Mon. Tryph. Suec., 227, ♂ ♀.

Mr. G. C. Champion gave me a male of this, which he took at Aviemore.

Holmgren, in his description, says the apex of the scutellum has a yellowish white mark, and then further on, as one of the points of distinction between this species and *Bohemani*, says the scutellum is black; in Mr. Champion's specimen the scutellum is quite black.

Cteniscus erosus, Holm.

L. c., 227, ♂ ♀.

I have a female taken by Mr. E. A. Atmore at Lynn in June, 1887. I have also another specimen which I took at Wimbledon, Surrey, July, 1880, which differs from Holmgren's description in having the hind coxæ and base of hind trochanters black. Holmgren says the base of the scutellum is red; in both my specimens it is black.

? *Cteniscus limbatellus*, Holm.

L. c., 241, ♂ ♀.

I have a male and a female which I believe to be this species, taken in the neighbourhood of Norwich in May and June. They differ from Holmgren's description in having the hind coxæ almost entirely black, and the middle pair black at the base, while the apex of the abdomen is black. In this latter respect they agree

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with *præustus*, but all the trochanters and front coxæ are pale yellow.

Cteniscus limbatus, Holm.

L. c., 241, ♂ ♀.

One taken at Brundall the end of June, the other the beginning of August in Cambridgeshire.

Cteniscus gnathoxanthus, Gr.

Tryphon gnathoxanthus, Gr., Ich. Eur., ii., 147, 94, ♀.
Cteniscus gnathoxanthus, Holm., *l. c.*, 231, ♂ ♀.

Mr. Bignell has taken a female of this very distinct species in Devonshire.

Pimpla pomorum, Ratz.

Ratz., Ichn. d. Forst., ii., 96, ♂ ♀; Tasch., Zeits. Ges. Nat., 267, ♀.

Dr. Capron has taken two females which he believes to be this species. They were taken where *Anthonomus pomorum* was abundant, and on which beetle *P. pomorum* is parasitic.

Glypta parvicaudata, n. s.

Niger, pedibus maxima ex parte rufis, segmentis 2 et 3 transversis, aculeo abdomine breviore.

Punctate, opaque; head narrow behind the eyes; antennæ about two-thirds the length of the body. Metathorax with five areæ. First segment of abdomen longer than the hind coxæ, keels extending to just beyond the middle of the segment; 2nd and 3rd transverse, more so in the female than in the male, the oblique incisions rather deep; aculeus of female about three-fourths the length of the abdomen; claws of hind tarsi distinctly pectinated. Transverse anal nervure of hind wing divided below the middle, rather less than one-third from the bottom.

Black; palpi pale; legs red, apex of hind femora obscurely fuscous, base of hind tibiæ palish, apex dark brown, indications of a fuscous ring below the base, hind tarsi dark brown, extreme base of joints palish; tegulæ and tubercles piceous-red; stigma palish brown; nervures dark. Male and female. Length, about 8 mm.

These differ from *G. consimilis* in having the scape of antennæ black, tubercles and tegulæ red, not pale straw,

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the aculeus and middle segments of abdomen are shorter, and transverse anal nervure divided lower down.

Mr. W. H. B. Fletcher bred a male and female from *Hysipetes ruberata* from Stornoway the end of May.

Glypta evanescens, Ratz.

Ratz., Ichn. d. Forst., ii., 103.

This species has been taken by Dr. Capron at Shiere: he says that, although much like *G. flavolineata*, the three first segments of the abdomen are at least one-half longer than broad, and the whole body much more slender in both sexes, and looks more like an *Ephialtes* than a *Glypta;* it is, however, a true *Glypta.*

Glypta pictipes, Tasch.

Tasch., Zeit. Ges. Nat., 1863, 276, ♀; Thom., Opus. Ent., 1847, ♂ ♀.

Mr. W. H. B. Fletcher has bred this species from *Diurnea flagella* from Slindon.

Glypta filicornis, Thom.

Thom., Opus. Ent., 1351, ♂ ♀.

A female of this insect has been bred by Mr. W. H. B. Fletcher.

Glypta genalis, Möller.

This was bred by Mr. E. A. Atmore ex *Tortrix viburnana* from Lynn, and was named for me by Prof. C. G. Thomson, at whose request I sent my species of *Glypta.*

Glypta punctifrons, Thom.

Prof. C. G. Thomson returned a male *Glypta* with this name, but where this and *G. genalis*, M., are described I do not know. This was bred by Mr. W. H. B. Fletcher ex *Antithesia dimidiana* from Rannock.

Lissonota obsoleta, n. s.

Niger; segmentis abdominis 1—3 rufis nigro-maculatis, pedibus rufis, aculeo abdominis longitudine.

Somewhat shining; head transverse, wider than the thorax,

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narrow behind the eyes; face parallel, very finely punctate; antennæ of female shorter than the body, about as long as the male. Mesonotum very finely punctate; metanotum finely rugose; supero-medial area present; mesopleura somewhat shining, finely punctate. First three segments of abdomen very finely punctate, the remainder smooth and shining; 1st segment of female about twice as long as wide, 2nd quadrate, 3rd subtransverse; male, 1st more than twice as long as wide, 2nd longer than wide, 3rd quadrate; aculeus as long as the abdomen. Areolet of wings pentagonal, outer nervure obsolete; external radial slightly curved; transverse anal divided a little below the middle.

Black; mouth and apex of clypeus reddish; female, first three segments of the abdomen red, black in the middle, the band in the 3rd segment interrupted; male, only the apex of the 2nd, the base and apex of the 3rd segment, narrowly reddish. Legs red, coxæ and base of hind trochanters in the male black. Squamulæ pale piceous; stigma palish brown. Male and female. Length, 3 mm.

A male and female of this very small *Lissonota* were bred from *Psyche intermediella* from the neighbourhood of Littlehampton by Mr. W. H. B. Fletcher. It comes near *L. linearis*, Gr., but is much smaller, the 2nd and 3rd segments of the abdomen are shorter, and the transverse anal nervure is interrupted nearer the middle.

Lissonota distincta, n. s.

Niger; pedibus rufis, tarsis posticis nigris, aculeo abdomine paulo longiore.

Subopaque; head transverse, wider than the thorax, behind the eyes slightly narrow; antennæ shorter than the body. Mesonotum finely punctate; scutellum rather shining, with fine scattered punctures; metathorax with very fine transverse rugæ; supero-medial area imperfectly defined; transverse costa distinct; mesopleura shining, punctate in front and below. First segment of abdomen about one-half longer than the width of the apex, finely reticulate, with a slight transverse groove before the apex; the apical margin of this and the two following segments slightly raised and shining; 2nd and 3rd segments subquadrate, almost transverse, finely punctate; remainder smoother and more shining; aculeus as long as the abdomen and metathorax. Areolet of wings petiolated; external radial nervure straight; transverse anal almost straight, divided about one-fourth from the bottom.

Black; palpi reddish, a spot in the middle of the mandibles and apex of clypeus yellowish, tubercles and tegulæ yellowish white.

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Legs red, middle tarsi brownish, hind tarsi black. Stigma palish brown. Female. Length, 5 mm.

This female was bred by Mr. W. H. B. Fletcher at the end of May from larvæ in fungi from Arundel Park. It appears to be very distinct from any previously-described *Lissonota;* the length of aculeus and black body easily separates it from the others.

Lissonota transversa, n. s.

Niger; pedibus rufis, capite et thorace flavo-maculato, aculeo corporis longitudine.

Subopaque; head transverse, narrow behind the eyes, sides rounded; face transverse, rather wider than the forehead; antennæ filiform, as long as the body. Thorax finely and densely punctate; metathorax with a longitudinal depression and prominent transverse costa. First segment of abdomen about one and a half times as long as the width of the apex, very finely punctate, interstices with fine transverse striations, with a slight transverse depression before the smooth apex; 2nd rather wider than long, sculpture the same as the 1st; 4th and remaining segments almost smooth; aculeus as long as the body. Wings with an areolet; transverse anal divided almost at the bottom.

Black; palpi and clypeus reddish yellow, middle of mandibles, a mark on each side of the forehead and collar, tubercles, and a triangular mark on shoulders, yellow. Extreme apex of segments obscurely reddish. Legs red, hind tarsi fuscous. Squamulæ yellow; stigma brownish red; wings yellowish. Female. Length, 6 mm.

I took this female at Norwich in August; it has also been taken by Dr. Capron at Shiere.

Lissonota trochanterata, n. s.

Niger; pedibus rufis, trochanteribus posticis tibiis posterioribus tarsisque nigris, aculeo abdomine longiore.

Subopaque; head transverse, narrow behind the eyes; antennæ as long as the body. Mesonotum closely and finely punctate; metathorax rather finely rugosely punctate, with no trace of areæ, but a distinct transverse costa. First segment of abdomen rather more than twice as long as wide; 2nd and 3rd longer than wide; the 1st and 2nd with very fine transverse striations; extreme apex rather finer; aculeus nearly as long as the body. Wings with an

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areolet; transverse anal nervure almost straight, divided below the middle one-third from the bottom.

Black; mandibles and palpi red, clypeus yellow, apex of 2nd and 3rd segments very narrowly reddish. Legs red, middle and hind trochanters black, hind tibiæ fuscous, somewhat rufous in the middle, tarsi nigro-fuscous, front pair paler. Squamulæ reddish, stigma black, extreme apex reddish. Female. Length, 10·5 mm.

A single female taken by Mr. Champion near Lincoln.

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XVIII. *Notes on an extraordinary race of* Arctia mendica, *Linn.* By George T. Porritt, F.L.S., &c.

[Read July 3rd, 1889.]

Plate XIV.

It will be remembered that a year ago,—on July 4th, 1888,—I exhibited, at a meeting of this Society, a long and curious series of 25 male and 19 female specimens of *Arctia mendica*, which I had bred from a small batch of eggs found on a dock-leaf. Of this series only about eight (including both sexes) approached the ordinary type of the species. A representative series of these specimens are the subjects of the first eight figures on Plate XIV., and an account of them has appeared at p. 39 of the 'Entomologist's Monthly Magazine' for July, 1888. I failed in an attempt to obtain eggs from any of these specimens; and as it did not occur to me that another attempt from casually found eggs would be likely to produce equally interesting results, I had no thought of further carrying on the experiment. However on June 7th my friend Mr. G. W. K. Crosland made a search for the species, and exactly on the same spot where the previous year's eggs were collected he found two female moths and another small batch of about 50 eggs. One of the moths—which was very strongly marked, much indeed like the most striking of those bred last year—having deposited a large batch of eggs, Mr. Crosland very kindly gave me the little batch he had found on the dock-leaf. From these I reared 47 larvæ, which during the week ending on May 14th last produced 45 moths, of which 22 were males and 23 females; and a more extraordinary series of moths from so small a batch of eggs I never saw. The 10 specimens I have picked out for my cabinet series, including the palest specimen bred as well as the darkest, I exhibit this evening, and they also form the subjects of the ten lower figures on the Plate, which

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has been kindly drawn for me by Mr. S. L. Mosley, of Huddersfield, a Fellow of this Society. The males of the 1889 series are, I think, not quite so dark, nor scarcely so strongly marked as those bred in 1888, which in markings correspond with the females exactly; and this is curious, as the females of 1889 are much darker and more strongly marked than those of 1888, as will at once be seen on reference to the Plate. By an unfortunate accident Mr. Crosland lost nearly all the large brood of larvæ from his dark moth. He was keeping them in an empty aquarium in the garden, and one day rain came on during his absence and almost all of them were drowned. He reared only three moths, all males, but they were darker and more strongly marked than mine, so that it is in the highest degree probable that had he been successful with the brood we should have had still more remarkable results.

The locality where this most curious race of *Arctia mendica* occurs is at Grimescar, about a mile north of the town of Huddersfield. It is the only locality where the species is known to occur in the Huddersfield district, and is there confined, so far as we know, to less than a hundred yards of a lane not more than ten or a dozen yards wide. Many years ago I used to get the species lower down in this lane, where it has not been seen of late years; and, as the area of its habitat is becoming, from no apparent cause, more restricted, the moth is evidently becoming at the same time much blacker.

Explanation of Plate XIV.

Figs. 1 to 8. *Arctia mendica*; two males and six females bred in 1888.

„ 9 „ 18. *A. mendica*; one male and nine females bred in 1889.

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XIX. *Descriptions of new species of* Scoliidæ *in the collection of the British Museum, with occasional reference to species already known.* By W. F. Kirby, F.E.S., Assistant in the Zoological Department, British Museum.

[Read July 3rd, 1889.]

Plate XV.

In rearranging the collection of *Scoliidæ* in the British Museum I have met with several interesting new species, which I describe in the present paper. The *Scoliidæ* are an interesting group, and, as a rule, not specially difficult, and it is singular that almost nothing has been done in this family since the catalogue (or more properly, monograph) published by Saussure and Sichel in 1864. Their genera are very easily recognisable, and therefore I have retained them provisionally, although they are founded too exclusively on neuration, and therefore sometimes separate closely-allied species, and in some few cases would lead to sexes or varieties of one species being placed in different genera.

The present paper relates only to the typical genera of *Scoliidæ* included in Saussure and Sichel's monograph, which, after fixing the types and weighing the claims of the various names to priority, should stand as follows:—

1. *Liacos*, Guér. (= *Triliacos*, S. & S.).
2. *Diliacos*, S. & S.
3. *Scolia*, F. (= *Triscolia*, S. & S.).
4. *Discolia*, S. & S.
5. *Elis*, F. (= *Trielis*, S. & S.).
6. *Campsomeris*, St. Farg. (= *Colpa*, St. Farg., = *Dielis*, S. & S.).

I have not included the doubtful genera *Cosila* and *Epomidiopteron*, which hardly belong to the restricted family *Scoliidæ*, in the present paper; nor two genera, likewise of doubtful position, described since the monograph, viz. *Pseudoscolia*, Rad., and *Dyscolesthes*, Westw., which the Museum does not at present possess.

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Genus I. Liacos, *Guér.*

(No new species described.)

Genus II. Diliacos, *Sauss. & Sich.*

Diliacos dubia, Smith.

Scolia dubia, Smith, Journ. Linn. Soc., Zool., vii., p. 28 (1863).

Smith describes a male from Ceram. The British Museum possesses three females, allied to *D. insularis*, Smith, which I regard (in the absence of the male) as probably belonging to *D. dubia*. One of them, from Ceram, was incorrectly labelled *fulgidipennis*; the other two are from the Solomon Islands.

Diliacos fulgidipennis, Smith.

Scolia fulgidipennis, Smith, Journ. Linn. Soc., Zool., iii., p. 132 (1859).

This insect is referred by Saussure & Sichel (Cat. Scol., p. 109) to *Discolia*, and was placed in the section with yellow antennæ. Smith, however, expressly refers the species to *Diliacos*, and describes the flagellum as obscure rufo-fuscous. The species is represented in the British Museum by a male and female, of which the female agrees best with Smith's description, and may provisionally stand as representing his species, although the antennæ are dark brown or black. The wings are brilliant coppery green. The male, on the other hand, agrees better with a female from New Guinea (unnamed in the collection), though Smith says the sexes scarcely differ. The punctuation is, however, so different that I have decided to regard it as a distinct species.

Diliacos eximius, n. s. (Pl. XV., fig. 1).

Long. corp. 27 mm.; exp. alar. 46 mm.

♂. Black, clothed with hair, most thickly on the prothorax, the sides of the metathorax and abdomen, and on the legs; clypeus densely and closely punctured in rows on the sides, nearly smooth on the median carina; thorax and abdomen covered with very fine crowded punctures, thorax black, mesothorax slightly shining, abdomen slightly iridescent, front legs with the curious clavate tibial spur, and the tufts on the inside of the tarsi rufous; wings

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rather long, narrow, and pointed, greenish blue, with the cells violet, and the hind margins narrowly brown; in some lights the wings appear much more strongly shining with blue and magenta, especially on the under surface; the outer fork of the recurrent nervure, which is marked with a large bulla in *D. fulgidipennis* is entire.

Hab. Aru.

Diliacos dorycus, n. s.

Exp. al. 50 mm.

♀. Closely resembles *D. eximius*. Clypeus hardly punctured; body more shining and much less hairy than in *D. eximius*; mesothorax smooth in the middle, the edges finely punctured; abdomen sparingly punctured; wings deep blue, with but little greenish mixture, but strongly violet, shading into magenta, at the base and over almost the whole surface beneath.

Hab. Dorey.

Genus III. Scolia, *Fabr.*

Scolia Halima, n. s.

Long. corp. 28 mm.; exp. al. 40 mm.

♀. Black, extremely thickly punctured, the middle of the clypeus, of the vertex, of the thorax, and of segments 2—4 of the abdomen, nearly smooth; the sides of the body, the terminal segments of the abdomen, and the legs thickly clothed with long black hair; abdomen beneath almost impunctate in the middle of the segments; wings hyaline with greenish nervures, edged with violet; a broad costal band on the fore wings, shining with purple and violet, covering the upper portion of the principal cells, and continued to the tip; on the inner margin of the fore wings and on the costa of the hind wings runs a stripe of the same colour for about two-thirds of the length of the wings.

Hab. Natal.

This species has a superficial resemblance to *Liacos nigrita*, Fabr., but apart from the difference in the neuration, the latter species is much smaller and paler, with the dark colouring hardly reaching the tip of the fore wings, and the punctuation is much less dense, especially on the mesothorax and on the first segment of the abdomen. In *S. Halima*, too, there is a deep and very strongly punctured concavity between the antennal ridge and the frontal ocellus.

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Scolia Alecto, Smith.

Scolia Alecto, Smith, Proc. Linn. Soc., Zool., iii., p. 10 (1858).

There is a male from Macassar, and a female from Makian, in the British Museum. There is no doubt that they belong to the same species, but the male is a true *Scolia* (i.e., *Triscolia*), while the female is a *Discolia*, thus proving that the two genera cannot be separated by neuration alone.

Scolia unimaculata, n. s.

Long. corp. 28 mm.; exp. al. 45 mm.

♀. Black, clothed with black hair on the sides; face thickly punctured, a very strong frontal ridge, rising from the inside of the emargination of the eyes, and running below the ocelli; the space between this and the antennæ is marked with very large and deep punctures, but the vertex is nearly smooth, and the occiput shows only a few small punctures. Thorax thickly punctured; the hinder half of the mesothorax smooth, except at the edges, and there are smaller bare spaces. Abdomen shining black, with violet reflections in a good light, the first three segments sparingly punctured (except a line at the base of the second segment), and the remainder very strongly. Under surface with the punctures more distinct, especially those towards the base; the first segment, and the middle of the second towards the extremity, smooth; the base of the third with very minute and crowded but distinct punctures. Wings strongly suffused with violet; the rounded cell at the base of the recurrent nervure (Burmeister's cell 5) yellowish subhyaline.

Hab. India.

Allied, not very closely, to *S. Alecto*, Smith.

A specimen from Java differs in the darker purple rather than violet colour of the wings, and in the much more intense violet lustre of the abdomen. Until more specimens are obtained it would be premature to regard it as more than a variety.

Scolia tyrianthina, n. s. (Pl. XV., fig. 2).

Long. corp. 20 mm.; exp. al. 33 mm.

♀. Black, hair short, face strongly punctured, vertex smooth, no frontal ridge; thorax with very large punctures; small bare spaces in the middle of the mesothorax and on the inside of the lateral lobes of the metathorax; abdomen black, with violet

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reflections; the basal half of the first segment coarsely punctured, and that of the second and third segments finely; the remainder coarsely. Abdomen beneath thickly punctured, the basal half of the third and fourth segments very finely. Wings of a deep uniform violet-blue.

Hab. Andaman Islands.

Allied to *S. undata*, Smith, but larger and differently punctured.

Scolia læviceps, n. s.

Long. corp. 23—26 mm.; exp. al. 23—24 mm.

♀. Black, the sides moderately hairy; head smooth and shining, with a few small scattered punctures; the prothorax, except at the front of the lobes, and the mesothorax, except in front, where it is thickly punctured, almost impunctate; scutellum and post-scutellum with large punctures, chiefly on the sides; metathorax and first segment of abdomen very thickly punctured, the remaining segments of the abdomen less thickly, and with smooth spaces in the middle, especially on the second and third; under surface of abdomen rather sparingly punctured, the middle of the first and last segments smooth; the base of the second and third smooth, or with nearly microscopic punctures; wings violet, with greenish reflections.

Hab. Australia.

Two females from Swan River and Western Australia. Not nearly allied to any other species before me.

Genus IV. Discolia, *S. & S.*

Discolia Chryseis, n. s. (Pl. XV., fig. 3).

Long. corp. 13—18 mm.; exp. al. 26—35 mm.

Black; abdomen blue-black, slightly shining, closely and uniformly punctured; head of female smoother, and with fewer and smaller punctures than that of the male; antennæ thick and obtuse, differing little in the sexes except in the number of joints; jaws inclining to pitchy, tibial claw of front legs reddish; hair and spines black; wings coppery green, inclining towards fiery on the outer half of the fore wings in the female.

Hab. Sierra Leone.

Resembles *D. affinis*, Guér., but differs from this and several allied species by its black antennæ.

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Discolia fasciatipennis, Smith.

Scolia fasciatipennis, Smith, Cat. Hym. Ins. B. M., iii., p. 103, n. 89 (1855).

Elis fasciatipennis, Sauss. & Sich., Cat. Scol., p. 169 (1864).

Scolia alaris, Sauss., Ann. Soc. Ent. France, (3), vi. p. 203 (1858); Sauss. & Sich., Cat. Scol. pp. 97, 282 (1864).

This species was referred by Saussure and Sichel to *Elis*, owing to its having been inadvertently included in a wrong section of *Scolia* by Smith.

Apart from the neuration, it cannot be confounded with *Liacos nigrita*, Fabr., in which the punctures are much smaller and less numerous, and the dark colouring of the wings is much paler, and almost confined to the neighbourhood of the costa and the base.

Discolia disparilis, n. s. (Pl. XV., fig. 7).

Long. corp. 21—26 mm.; exp. al. 36—48 mm.

Black, hairy, thickly punctured, the convex space between the antennal ridge and the frontal ocellus, and the middle of the thorax, and of the second and third segments of the abdomen, smooth and shining, and sparingly punctured; its under surface but slightly punctured in the female. Wings clouded hyaline; the whole of the cells, and a broad band on the costa of the fore wings, ceasing before the tip, violet.

Hab. Natal; Angola.

There are two females and a male from Natal in the Collection, and a male from Angola. The male from Natal differs somewhat, and may belong to another species. It is much smaller (long. corp. 16 mm.; exp. al. 30 mm.), and resembles *D. fasciatipennis*, Smith, in size. The abdomen is more blue-black, and more densely punctured beneath. There are probably several allied species, similarly coloured. The present species has a superficial resemblance to *Scolia Halima*, just as *Discolia fasciatipennis* has to *Liacos nigrita*, Fabr. This insect stood in the Collection as *S. alaris*, Sauss.; but the latter species is certainly synonymous with *S. fasciatipennis*, Smith.

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Discolia vittifrons, Sich. (?).

(?) *Scolia vittifrons*, Sich., Cat. Scol., p. 285 (1864).

Sichel describes this species from Siam. There are three specimens which agree with the description in the British Museum; two females from North China and Japan, and a male from North China. The pair from North China expand from 33 to 38 mm. In the male the abdomen is more iridescent than in the females, and the yellow spots on the third segment are placed in front; in the female the head is entirely black, and the yellow spots stand in the middle of the segment. The female from Japan is considerably larger (expands 43 mm.), and has an orange band between the eyes above the antennæ, like the male from China. Until more specimens are obtained I prefer to refer these three provisionally to *D. vittifrons*.

Discolia punctatissima, n. s.

Long. corp. 15 mm.; exp. al. 30 mm.

♀. Black, sparingly clothed with short black hairs, and very thickly and uniformly punctured, only a small space at the base of each of the lateral lobes of the metathorax being smooth; abdomen with a slight greenish iridescence. Wings dull greenish brown in the shade, with black or greenish nervures, but as they are turned to the light, gradually changing, at first along the nervures, and then over the whole surface to the most brilliant violet.

Hab. Solomon Islands.

Allied to *D. læviceps*, Smith, from Hong Kong. It is also allied to a specimen from Borneo, in too poor condition for positive determination, but which is possibly identical with *D. nitidula*, Sauss., a Javanese species. It also much resembles *D. soror*, Smith, from Australia, in which, however, the lateral lobes of the metathorax are punctured to the base.

Discolia Hecate, n. s. (Pl. XV., fig. 4).

Long. corp. 23—41 mm.; exp. al. 44—64 mm.

♂. Black, sides and legs with black hair; shoulders, scutellum, and post-scutellum pale yellow; mesothorax with large punctures, and a groove on each side running forwards from near the corners of the scutellum; mesothorax and first segment of the abdomen

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thickly punctured, the rest more sparingly; segments 2—4 greenish, 2 and 3 with a large yellow spot on each side, and segment 4 with a small one on each side; wings deep violet-purple.

♀. Black, smooth and shining, sparingly punctured, except on the prothorax, front of mesothorax, metathorax, and the hinder portions of the segments of the abdomen; post-scutellum with a short transverse yellow streak, thick in the middle and narrow at the ends, and segments 2 and 3 with a large yellow spot on each side. In one specimen there is also a yellow dot on the sides of the prothorax, and a small perpendicular yellow dash on the scutellum. Wings deep violet.

Hab. Trinidad.

Allied to *D. guttata*, Burm., but in that species (apart from colour differences) the male is more hairy, and the female is much less thickly punctured towards the extremity of the abdominal segments. The supposed variety of the male of *D. guttata*, mentioned by Saussure and Sichel (Cat. Scol., p. 131), probably belongs to this species.

Genus V. Elis, *Fabr.*

Elis lugens, n. s. (Pl. XV., fig. 8).

Long. corp. 29 mm.; exp. al. 50 mm.

♂. Dull black, the sides and legs hairy; antennæ rather stout; middle of the clypeus smooth, surrounded with large punctures; thorax closely and evenly punctured, with a very small oval longitudinal smooth spot in the middle of the mesothorax; abdomen with a very slight greenish iridescence, very finely and evenly punctured, the first segment with rather larger punctures; wings very long, narrow, and pointed, smoky yellowish hyaline, with pitchy-black nervures, the middle of the wings rather lighter; the third cubital cell very large and almost square.

Hab. Rio Grande do Sul.

Very distinct from any previously-described species, and may ultimately form a new genus.

Elis Rudaba, n. s.

Long. corp. 14 mm.; exp. al. 24 mm.

♂. Black and yellow, clothed with grey hair. Face very hairy, antennæ and mandibles ferruginous-brown, sides of labrum yellow. Thorax black; the prothorax, a stripe on the pleura, at first straight, and then narrowed and curved backwards, the

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scutellum, post-scutellum, and the middle of the metathorax above, yellow. Abdomen with the segments black in front and yellow behind; the first segment is entirely black beneath, and is bordered behind with black above for most of its width. The yellow portion of the first three or four segments has a concave excavation in the middle, and is again indented with black on the sides; beneath the black extends squarely at the sides, but with a curve in the middle, into the yellow; towards the extremity the black and yellow bands are more even, though the yellow still projects beyond the black on the sides. Legs black, with grey hair; femora and tibiæ yellow above, and the former likewise on the sides. Wings hyaline, the nervures rusty yellow. Punctuation apparently fine and even, but much concealed by the pubescence.

Hab. Chaman.

Allied to *E. garrula*, Erichs., from which it differs in the colour of the head and wings.

Genus VI. Campsomeris, *St. Farg.*

Campsomeris tomentosa, n. s.

Long. corp. 18 mm.; exp. al. 30 mm.

♀. Black; head and thorax clothed above with gilded pubescence, more silvery on the pleura; jaws, antennæ, and legs ferruginous, the hair on the legs mostly grey; abdomen with the first segment clothed, and the others fringed, with grey hair (nearly white beneath); the first segment with an irregular tawny spot on each side above; the second tawny above, with a black stripe curving backwards from each side, in front of its extremities, being a disconnected black stripe across the middle; third segment bordered behind with a tawny stripe, a little curved forwards at the ends; wings of a slightly yellowish hyaline, with tawny nervures.

Hab. Sierra Leone.

Allied to *C. crinita*, Sauss.

Campsomeris princeps, n. s.

Long. corp. 30 mm.; exp. al. 45 mm.

♀. Black; vertex, occiput, and thorax clothed with golden hair; head and abdomen at base nearly smooth; a patch of white hairs beneath each antenna; thorax with large punctures, but with a bare V-shaped space in the middle of the mesothorax; abdomen with the basal segment clothed with golden hairs, the

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second more slightly; the second, third, and fourth fringed behind with ferruginous hairs, and the third, fourth, and fifth fringed before with yellow hairs; the sixth fringed in front with golden hairs; the terminal segment bare, densely striate-punctate; legs clothed with bristly yellow hair, shading into pale red towards the tarsi; wings hyaline, with brown nervures, a little smoky towards the costa.

Hab. Delagoa Bay.

Allied to *C. undulata*, Smith. One of the largest of the African species.

Campsomeris regalis, Sauss. & Sich.

Elis regalis, Sauss. & Sich., Cat. Scol., pp. 190, 298 (1864).

There is a specimen labelled "East Indies" in the Museum, from F. Smith's collection, which agrees with the description of this species, but is not much more than half the size of the typical specimens.

Campsomeris ceylonica, n. s.

Long. corp. 9—17 mm.; exp. al. 22—26 mm.

♂. Head and thorax black above; face yellow below the black antennæ, with a blackish spot in the raised middle of the clypeus; head and thorax mostly clothed with fulvous hairs above; the pleura and more or less of the middle of the thorax above with pale greenish golden hairs; legs red; abdomen with a violet-purple iridescence, the first four segments with a tawny band behind, these segments edged behind, and the remainder clothed with fulvous hair. Wings yellowish, with yellow veins, the costa and tip dusky.

♀. Head black or ferruginous; antennæ and mandibles ferruginous; head and thorax clothed with fulvous hair, except the metathorax, which is clothed with pale golden hair, especially on the sides; legs red, coxæ and femora often darker; abdomen black above and rufous below; the base of the first segment and the extremities of all the segments bordered with fulvous hair, which is almost continuous on the hinder segments; on the first three segments this is preceded by a yellowish tawny stripe, that on the second segment with a large projection in the middle. Wings yellowish hyaline, more yellow in the cells on the costa, and with a nearly square brown subapical patch.

Hab. Ceylon; a single specimen also from Bombay.

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Allied to *C. Iris*, St. Farg., and *C. aurulenta*, Smith; the male differs from both in the first segment of the abdomen being hardly constricted, while in the female *C. Iris* is distinguished by having only four pale bands on the abdomen, and *C. aurulenta* by wanting the sub-apical patch.

Campsomeris Whitelyi, n. s. (Pl. XV., fig. 6).

Long. corp. 22 mm.; exp. al. 41 mm.

♀. Black; antennæ inclining to pitchy; mandibles red. Head and thorax clothed with shaggy hair, which is yellowish grey in front and grey behind. Punctuation scanty, and almost confined to the neighbourhood of the ocelli, the front and sides of the mesothorax, the post-scutellum, and the metathorax. Abdomen with the first segment black, shining, clothed with shaggy grey hair; segments 2 and 3 velvety black in front and bright yellow behind, the yellow portion exhibiting a straight transverse dividing line before its extremity, and swelling out on each side in front; segment 4 with a yellow band before the extremity; segments 3—5 with a fringe of yellow hairs at the base; segment 6 reddish, especially at the extremity, and with a basal fringe of very dark red hairs; coarsely but not deeply punctured. Abdomen beneath shining black, with fringes of grey hairs at the base of the segments, and generally with two transverse rows of punctures running between them, the latter with long hairs springing from them towards the sides; the fringe at the base of the sixth segment is yellowish. Legs black, clothed with long grey hair; the tarsi and their spines, the terminal tibial spines, and the hollow beneath the femora are more or less reddish. Wings yellowish hyaline, with ferruginous nervures; costa dark rusty brown nearly to the middle, and then suffused with ferruginous as far as the cells extend.

Hab. Tambo Valley, Peru (*Whitely*).

Closely allied to *C. limosa*, Burm., from California and Mexico.

Campsomeris bivittata, n. s. (Pl. XV., fig. 5).

Long. corp. 17—21 mm.; exp. al. 31—38 mm.

♂. Stout; black, with cinereous hair, everywhere closely punctured, with no smooth spaces even in the middle of the mesothorax or at the base of the metathorax; abdomen with segments 2 and 3 yellow above on the hinder two-thirds, the yellow bands being

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more or less deeply indented in the middle; wings yellowish hyaline, nervures and costa tawny.

Hab. Rio Grande.

Unlike any species in the Collection, but probably allied to *C. obesa*, Staud.

Explanation of Plate XV.

Fig. 1. *Diliacos eximius*, ♂.
2. *Scolia tyrianthina*, ♀.
3. *Discolia Chryseis*, ♂.
4. *D. Hecate*, ♀.
5. *Campsomeris bivittata*, ♂.
6. „ *Whitelyi*, ♀.
7. *Discolia disparilis*, ♀.
8. *Elis lugens*, ♂.

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XX. *On some Lepidoptera from New Guinea.* By Edward Meyrick, B.A., F.E.S.

[Read August 7th, 1889.]

The species included in the following paper are derived from two sources, *viz.* (1), a collection received from Baron Ferdinand von Müller, K.C.M.G., F.R.S., &c., made by Sayer on Mount Obree and the adjoining ranges in New Guinea, when accompanying Mr. Cuthbertson's Exploring Expedition there under the direction of the Royal Geographical Society of Australia; and (2), a number of specimens, principally Geometers and Pyrales, collected by Kowald near Port Moresby, and obtained from him by Lord Walsingham, who kindly transferred them to me. In both collections there were a certain proportion of additional species, especially amongst the *Noctuæ* and *Pyrales*, which I have not thought it well to describe, as being represented by single, imperfect, or female specimens only, and belonging to obscure groups; descriptions drawn from such material would be necessarily imperfect, and a source of confusion rather than of benefit to science.

SPHINGIDÆ.

Deilephila, *Ochs.*

1. *Deilephila heliodes*, n. s.

♂, 86 mm. Head light ochreous-brown, crown dark fuscous. Palpi fuscous-reddish, base whitish. Antennæ brown. Thorax ochreous, becoming dark fuscous anteriorly, margin of shoulders reddish-grey-whitish; a well-defined whitish-ochreous spot near each shoulder. Abdomen brownish-ochreous, segments somewhat suffused with dark fuscous at base. Legs light ochreous, more or less reddish-tinged. Fore wings with hind margin quite straight; light ochreous-brown, faintly purplish-tinged, with small scattered dark fuscous strigulæ; four straight dark fuscous transverse lines nearly parallel to hind margin, at one-fifth, two-fifths, two-thirds, and four-fifths, third strongest and most conspicuous, fourth slender,

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lighter, waved on lower half; costal edge dark fuscous from base to second line; a small round black grey-centred spot in middle of disc; an indistinct dentate fuscous inwards-curved line from apex to anal angle; cilia rather dark fuscous, mixed with red. Hind wings bright orange; a moderate dark fuscous hind-marginal band, attenuated towards apex, and more strongly towards anal angle; cilia reddish, towards anal angle ochreous-whitish; towards inner margin a deep longitudinal furrow on upper surface, filled with dense hairs towards base.

One specimen (*Sayer*). This appears to be very distinct from any other species of which I can learn; it is allied to *D. erotus*.

2. *Deilephila celerio*, L.

One specimen (*Sayer*).

COCHLIOPODIDÆ.

Hydroclada, n. g.

Tongue rudimentary. Palpi moderate, subascending, densely and somewhat roughly scaled. Antennæ somewhat over one-half, in ♂ bipectinated, towards apex simple. Legs densely rough-scaled. Fore wings with vein 1 furcate at base, 2 from three-fourths, 7 and 8 out of 9, 10 out of 9 near base, forked parting-vein well-developed. Hind wings with 1*a*, 1*b*, 1*c* all present, 6 and 7 stalked, 8 connected with cell by a bar rather near base, six variably branched (from simple to quadrifurcate) pseudoneuria rising from it, parting-vein well-marked.

The structures, which I have here called *pseudoneuria*, appear to me at present of a very doubtful nature. They are chitinous thickenings, which have all the appearance of true veins, but their large number renders it impossible to suppose that they can represent any portion of the original vein-system of the ancestors of the Lepidoptera; the main stems might possibly be thus accounted for, but the numerous branches could not. Further, the extreme variability of these branches, which differ much in the two sexes, and even in the two wings of the same specimen, and a certain indefiniteness of outline, tend to indicate abnormality of development. I prefer, however, to express no definite opinion until I have examined a greater number of allied forms than I have yet been able to procure.

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3. *Hydroclada antigona*, n. s.

♂ ♀, 30—34 mm. Head, palpi, antennæ, thorax, abdomen, and legs rather light reddish ochreous, in ♂ less reddish. Fore wings triangular, costa moderately arched, apex rounded, hind margin somewhat obliquely rounded; light reddish-ochreous, in ♂ paler and less reddish; markings reddish-brown; a cloudy bar from costa near base, reaching half across wing; a small triangular spot on costa before apex, whence proceed a straight slender line towards inner margin before middle, but not reaching it, and a similar line to hind margin above anal angle; a small dark fuscous spot in disc, close before the oblique line; cilia light reddish-ochreous, tips dark fuscous, with ill-defined blackish dots opposite veins. Hind wings pale reddish-ochreous; a small reddish-brown suffusion on costa before apex; cilia as in fore wings.

Port Moresby (*Kowald*); two specimens.

Autocopa, n. g.

Tongue rudimentary. Palpi moderate, porrected, densely and rather roughly scaled. Antennæ about one-half, in ♂ bipectinated to apex. Legs densely rough-scaled. Fore wings with vein 1 furcate at base, 2 from two-thirds, 7 and 8 out of 9, forked parting-vein well-marked. Hind wings with 1*a*, 1*b*, 1*c* all present, 6 and 7 stalked, 8 rising out of upper margin of cell near base, parting-vein well-marked.

4. *Autocopa monoloncha*, n. s.

♂ 26 mm., ♀ 38 mm. Head, palpi, antennæ, thorax, abdomen, and legs fuscous. Fore wings triangular, costa nearly straight, apex obtuse, hind margin obliquely rounded, inner margin rounded; rather dark fuscous; an indistinct darker spot in disc beyond middle; a straight dark fuscous line from costa before apex to three-fourths of inner margin, anteriorly indistinctly pale-margined, and preceded by an obscure pale irroration. Hind wings fuscous.

Two specimens (*Sayer*).

SYNTOMIDIDÆ.

Euchromia, *Hb.*

5. *Euchromia cyanitis*, n. s.

♂, 45 mm. Head grey-blue, lower part of face whitish. Antennæ black. Thorax black with grey-blue reflections, shoulders

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with a red-brown spot. Abdomen ochreous-yellow, base of segments rather broadly black above, basal segment reddish-brown, second and third posteriorly pale blue above, anal segment blue above. Fore wings black; base spotted with pale blue; a bright metallic-blue crescentic discal spot; normal spots transparent, faintly purplish-tinged; first small, elongate; second and third confluent into a transverse-oblong blotch, unevenly bisected; fourth elongate, with a small very narrow adjacent similar spot beneath; fifth subcordate. Hind wings black; a bright metallic-blue crescentic discal spot; normal spots moderately large, transparent, faintly purplish-tinged; first almost basal, bisected, not reaching margins; second transverse-oval, trisected, not reaching margins.

One specimen (*Sayer*).

ARCTIADÆ.

Exotrocha, *Meyr.*

6. *Exotrocha liboria*, Cr.

Dinner Island (*Kowald*); one specimen, in July.

Tigrioides, *Butl.*

7. *Tigrioides nana*, Walk.

Port Moresby (*Kowald*); one specimen.

8. *Tigrioides nephelozona*, n. s.

♀, 35 mm. Head, palpi, antennæ, thorax, abdomen, and legs yellow-ochreous. Fore wings elongate, gradually dilated, costa slightly arched, apex rounded, hind margin obliquely rounded; rather light yellow-ochreous; a rather narrow faint pale fuscous cloudy fascia at two-thirds, somewhat curved, parallel to hind margin. Hind wings whitish ochreous, yellowish-tinged.

One specimen (*Sayer*).

Petalopleura, n. g.

Tongue developed. Palpi short, porrected, second joint rough-scaled beneath. Antennæ in ♂ filiform, thinly ciliated, rough-scaled above towards base, with a slight sinuation above basal joint. Fore wings with vein 2 from two-thirds, 3 and 4 stalked, 5 absent, 8 and 9 out of 7, 11 anastomosing with 12. Hind wings in ♂ with costa very convex, costal edge thickened, beneath with

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a broad marginal fold of petaloid scales from base to three-fourths, enclosing a fringe of hair-scales; 3 absent, 5 absent, 6 in ♂ absent, in ♀ stalked with 7, 8 from about middle.

9. *Petalopleura phæocephala*, n. s.

♂ ♀, 25—26 mm. Head, collar, and palpi in ♂ dark fuscous, in ♀ deep ochreous-yellow. Antennæ dark fuscous. Thorax deep ochreous-yellow. Abdomen ochreous-yellow. Legs fuscous. Fore wings elongate, rather strongly dilated, costa moderately arched, somewhat bent beyond middle, apex obtuse, hind margin bowed; deep ochreous-yellow. Hind wings ochreous-yellowish.

Two specimens (*Sayer*).

Teratopora, n. g.

Tongue developed. Palpi very short, porrected, second joint with rough projecting scales beneath. Antennæ in ♂ filiform, shortly ciliated, with scattered longer cilia. Fore wings with vein 1 connected by transverse bar with 2, 3 and 4 stalked, 5 absent, 6 separate or (perhaps abnormally) rising out of 3, 8 and 9 out of 7, 11 absent. Hind wings in ♂ with apex broadly truncate; 3 and 4 stalked, 5 absent, 6 absent, 8 from about middle.

10. *Teratopora haplodes*, n. s.

♂, 24—26 mm. Head, palpi, antennæ, thorax, and legs pale brownish-ochreous. Abdomen whitish-ochreous. Fore wings elongate, moderately dilated, costa gently arched, apex obtuse, hind margin obliquely rounded; pale brownish ochreous; a very indistinct narrow irregular fuscous cloud at three-fifths, extending from disc to inner margin. Hind wings whitish-ochreous.

Port Moresby (*Kowald*); two specimens.

Tylanthes, n. g.

Tongue developed. Palpi short, subascending, filiform. Antennæ in ♂ filiform, shortly ciliated, with scattered longer cilia. Fore wings in ♂ beneath with circular cushion of scales in middle of disc, and brush-like tuft from a glandular swelling beneath subcostal vein above it; vein 1 connected by a transverse bar with cell before angle, lower part of cell contorted, 3 and 4 stalked, 5 absent, 6 out of 7, 8 and 9 out of 7, 11 absent. Hind wings in ♂ small, beneath with a glandular swelling and tuft of scales, covered by a pencil of hairs, towards middle of costa, which is dilated; transverse vein absent, 3, 4, 5, 6 absent.

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11. *Tylanthes ptochias*, n. s.

♂, 22 mm. Head, palpi, antennæ, thorax, and legs pale brownish-ochreous. Abdomen light yellowish-ochreous, anal tuft large. Fore wings rather elongate-triangular, costa gently arched, apex rounded, hind margin obliquely rounded; pale brownish-ochreous, somewhat sprinkled with fuscous, which forms an indistinct suffusion in middle of disc and towards anterior half of inner margin; costal edge more yellowish-tinged. Hind wings pale ochreous-yellowish.

Port Moresby (*Kowald*); one specimen.

Macaduma, *Walk.*

Tongue developed. Palpi moderate, curved, ascending, second joint with appressed scales, terminal joint slender, pointed. Antennæ in ♂ filiform, shortly ciliated, with scattered longer cilia. Fore wings with veins 3 and 4 separate, 5 parallel, 8 and 9 out of 7. Hind wings with veins 3 and 4 stalked, 6 and 7 stalked, 8 from middle.

12. *Macaduma tortricella*, Walk.

Macaduma tortricella, Walk., Suppl., 1705.

♂, 19 mm. Head, palpi, and thorax reddish-ochreous-brown. Antennæ light ochreous, base brownish. Abdomen whitish-ochreous, reddish-tinged, lateral hairs posteriorly and a large expansible anal tuft ochreous-yellow. Legs fuscous. Fore wings moderate, costa gently arched, rather abruptly bent beyond middle, apex obtuse, hind margin rather oblique, slightly angulated above middle; reddish-brown, costal edge more reddish; an obscure darker fuscous suffusion covering basal two-thirds of wing, except towards costa and on a cloudy patch towards middle of inner margin. Hind wings pale yellowish-ochreous, slightly fuscous-tinged towards costa before apex.

Port Moresby (*Kowald*); one specimen. Walker's type is said to be from Java.

Licnoptera, n. g.

Tongue developed. Palpi short, curved, ascending, second joint thickened with scales, terminal joint slender, filiform. Antennæ in ♂ filiform, thinly ciliated. Fore wings with vein 2 from rather near angle, 3 and 4 stalked, 5 absent, 8 and 9 out of 7, 10 absent. Hind wings in ♂ with costa much expanded, inner margin clothed along edge with very long dense fine hairs, and with a longitudinal

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fold containing pencil of hairs; vein 3 absent, 5 parallel to 4, 6 and 7 short-stalked, 8 from beyond middle.

13. *Licnoptera crocodora*, n. s.

♂, 19 mm. Head bright yellow. Palpi fuscous, beneath pale yellowish. Antennæ fuscous. Thorax purple, collar and a dorsal spot behind it yellow. (Abdomen broken.) Legs whitish-ochreous, anterior tibiæ and tarsi white ringed with fuscous. Fore wings elongate, moderate, slightly dilated, costa almost straight, apex obtuse, hind margin rather obliquely rounded; bright clear yellow; markings bronzy-ochreous-brown, purple-shining, margined with deeper purple-blue and black scales; a rather narrow basal fascia, rather wider on inner margin; a moderate slightly inwards-curved fascia from two-thirds of costa to three-fourths of inner margin, and a narrower fascia, attenuated above, along hind margin, coalescing on lower half so as to form a blotch; a slender white hind-marginal line, forming a small spot at apex; cilia rather dark ochreous-fuscous. Hind wings very broad; pale whitish-ochreous, paler towards costa, towards hind margin tinged with pale reddish-brown, hairs of inner margin yellow-ochreous; cilia ochreous-whitish.

One specimen (*Sayer*).

Chlorogenia, n. g.

Tongue developed. Palpi moderate, porrected, rough-scaled beneath. Antennæ in ♂ filiform, shortly ciliated, with scattered longer cilia. Fore wings with vein 2 from near three-fourths, 5 absent, 7 and 8 stalked, 11 bent towards 12. Hind wings with veins 4 and 5 absent, 6 and 7 stalked, 8 from middle.

14. *Chlorogenia cholerota*, n. s.

♂ ♀, 15—17 mm. Head, palpi, antennæ, thorax, and legs pale whitish-ochreous. Abdomen ochreous-whitish, anal tuft of ♀ ochreous-brownish. Fore wings moderately elongate, dilated, costa moderately arched, apex obtuse, hind margin rounded, somewhat oblique; whitish-ochreous; five irregular rather light brown transverse lines; first near base, angulated; second broken into three or four spots; third from before middle of costa to middle of inner margin, slightly curved outwards, indented above inner margin; fourth from two-thirds of costa to anal angle, rather abruptly sinuate outwards in middle and indented beneath it; fifth parallel to fourth but more irregular, tending to

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and to form spots; cilia whitish-ochreous, basal half barred with fuscous. Hind wings ochreous-whitish.

Port Moresby (*Kowald*); two specimens.

Calligenia, *Dup.*

15. *Calligenia pyraula*, Meyr.

Port Moresby (*Kowald*); two specimens.

16. *Calligenia phryctopa*, n. s.

♂, 29 mm. Head and palpi bright rosy, with a grey spot on crown. Antennæ dark grey. Thorax bright rosy, mixed with pale ochreous and spotted with grey. Abdomen pale rosy, anal tuft ochreous-tinged. Legs rosy, tarsi light ochreous. Fore wings elongate, moderately strongly dilated, costa gently arched, apex obtuse, hind margin obliquely rounded; crimson-rosy, more or less suffused with dark grey in disc; a rather large ochreous-whitish trapezoidal spot, edged with bright crimson, near base, not quite reaching margins, followed by a cloudy dark grey curved fascia; a moderate roundish ochreous-whitish spot in disc beyond middle, margined above by a bright crimson spot, and followed by a narrow irregularly curved dark grey fascia, margined posteriorly by a series of bright crimson dots; veins posteriorly suffused with dark grey; hind margin spotted with brighter crimson between veins. Hind wings pale whitish-ochreous, suffused with pale rosy towards hind margin and inner margin.

One specimen (*Sayer*).

17. *Calligenia placens*, Walk.

Barsine placens, Walk., Suppl., 251; *Calligenia cyclota*, Meyr., Proc. Linn. Soc. N. S. W. 1886, 705.

Port Moresby (*Kowald, Sayer*); six specimens. Walker's type is from Timor.

18. *Calligenia melitaula*, Meyr.

Dinner Island (*Kowald, Sayer*); seven specimens.

Amalodeta, n. g.

Tongue developed. Palpi short, porrected, shortly rough-scaled beneath. Antennæ in ♂ filiform, shortly ciliated, with scattered longer cilia. Fore wings with vein 2 from two-thirds, 6 and 7 out

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of 8, 9 and 10 long-stalked. Hind wings with veins 6 and 7 long-stalked, 8 from middle.

19. *Amalodeta electraula*, n. s.

♂, 18 mm. Head, palpi, antennæ, thorax, and legs pale whitish-ochreous. Abdomen ochreous-whitish. Fore wings moderately elongate, dilated, costa moderately arched, apex rounded, hind margin obliquely rounded; whitish-ochreous; markings cloudy, yellowish-brown; three slender irregular transverse lines, first from one-fourth of costa to before middle of inner margin, second from before middle of costa to beyond middle of inner margin, obtusely angulated outwards below middle, third from two-thirds of costa to anal angle; a small round fuscous spot in disc between second and third lines; a transverse cloudy mark towards hind margin in middle, and two small cloudy spots on hind margin above and below middle; cilia ochreous-whitish, base barred with pale yellowish-brown. Hind wings whitish, thinly scaled.

Port Moresby (*Kowald*); one specimen.

Sorocostia, *Ros.*

20. *Sorocostia tetrophthalma*, n. s.

♀, 14 mm. Head white, thinly sprinkled with fuscous. Palpi 2½, white, suffusedly irrorated with dark fuscous except above. Antennæ ochreous-whitish. Thorax ochreous-whitish, thinly sprinkled with fuscous. Abdomen grey-whitish. Legs whitish irrorated with fuscous, apex of joints white. Fore wings elongate-triangular, costa gently arched, apex obtuse, hind margin rather obliquely rounded; light greyish-ochreous, with fine scattered black scales; the three usual subcostal tufts preceded by small cloudy blackish spots; a cloudy fuscous suffusion towards hind margin, broadest below middle, cut by an indistinct irregular paler subterminal line; cilia mixed with ochreous, dark grey, and whitish points, with a darker line beyond middle, and basal half barred with darker. Hind wings pale grey, becoming grey-whitish towards base; cilia grey-whitish.

Port Moresby (*Kowald*); one specimen.

Epizeuctis, n. g.

Face with projecting scales; tongue well-developed. Palpi moderately long, straight, porrected, second joint with dense rough projecting hairs above and below, terminal joint obtuse. Antennæ

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in ♂ shortly bipectinated, towards apex simple, pectinations clothed with long cilia, basal joint somewhat tufted. Fore wings with tufts of scales on surface; vein 2 from beyond middle, 7 absent, 8 and 9 stalked, 10 absent. Hind wings with veins 2, 3, and 5 parallel, 4 absent, 6 and 7 stalked, 8 from middle.

21. *Epizeuctis innocua*, Butl.

Nola innocua, Butl., Proc. Zool. Soc. Lond. 1880, 671.

♂ ♀, 12—15 mm. Head, antennæ, and thorax white, sometimes sprinkled with dark fuscous. Palpi 2½, white, externally sprinkled with fuscous. Fore wings rather elongate-triangular, costa gently arched, apex obtuse, hind margin obliquely rounded; white; an ochreous-brown spot, sometimes marked with black beneath, on costa near base; a somewhat curved rather irregular blackish transverse line about one-third, sometimes partially obsolete, followed by a small ochreous-brown spot beneath costa, and sometimes by a spot on inner margin; a rather irregularly curved fuscous line at two-thirds, preceded on costa by a moderate ochreous-fuscous spot, and nearly followed by a more or less parallel slender blackish line; a rather irregular ochreous-fuscous subterminal line; costa sometimes dotted with dark fuscous; some indistinct ochreous spots before hind margin; cilia white sprinkled with blackish, basal half indistinctly barred with fuscous. Hind wings and cilia white.

Port Moresby (*Kowald*); seven specimens. Butler's type is from Formosa.

Sarotricha, *Gn.*

22. *Sarotricha demiota*, n. s.

♂ ♀, 23—25 mm. Head, palpi, and thorax light grey or brown, sprinkled with darker; posterior margin of thorax and a dot on each side of back obscurely blackish. Antennæ fuscous. Abdomen grey-whitish. Legs brownish or greyish, posterior pair grey-whitish. Fore wings oblong, moderate, costa rather strongly arched towards base, otherwise nearly straight, apex obtuse, hind margin hardly oblique, nearly straight, rounded beneath; light grey, mixed or more or less wholly suffused with light brownish-ochreous; a transverse ridge of raised scales in disc at two-fifths, and another at three-fifths, blackish on posterior side, in ♀ little apparent (unless rubbed), and second replaced by two black dots; some black scales on inner margin about one-fourth; an obscure

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fuscous somewhat curved subdentate line from one-third of costa to one-third of inner margin; a minute white dot in disc slightly before middle; generally a rather broad darker sometimes reddish-tinged suffusion extending across wing from two-thirds of costa to middle of inner margin; a more or less brownish-ochreous line from two-thirds of costa to two-thirds of inner margin, upper two-thirds moderately curved outwards, anteriorly darker-margined, posteriorly margined by a line of slightly raised darker or partially blackish scales, closely followed by a cloudy fuscous line; an irregular cloudy fuscous subterminal line; a dark fuscous interrupted hind-marginal line or series of subconfluent dots; cilia fuscous or grey. Hind wings grey-whitish, hind margin infuscated; a dark fuscous hind-marginal line; cilia whitish, with a cloudy fuscous line near base.

Port Moresby (*Kowald, Sayer*); three specimens. Nearly allied to *S. undulana*, Hb., and *S. exophila*, Meyr., and intermediate in size between them, but readily distinguished from both by the different shape of wing, and differing also in marking.

Hectogama, n. g.

Tongue developed. Palpi rather short, porrected, second joint shortly rough-scaled beneath. Antennæ in ♂ subdentate, moderately strongly ciliated (1½). Fore wings with vein 2 from before middle, 4 and 5 stalked, 6 and 7 stalked, 8 and 9 stalked, 11 anastomosing with 12. Hind wings with veins 3 and 4 stalked, 5 absent, 6 and 7 stalked, 8 from four-fifths.

23. *Hectogama dissozona*, n. s.

♂, 24 mm. Head, palpi, antennæ, abdomen, and legs ochreous-yellowish. Thorax dark purplish-fuscous, anterior margin suffusedly ochreous-yellowish. Fore wings rather elongate-triangular, costa gently arched, apex rounded, hind margin rather obliquely rounded; whitish-ochreous; costal edge ochreous-yellowish; base narrowly dark fuscous; two moderate rather inwards-curved dark purplish-fuscous transverse fasciæ, first from two-fifths of costa to two-fifths of inner margin, second from four-fifths of costa to two-thirds of inner margin, rather dilated beneath; a subtriangular dark fuscous spot on hind margin above anal angle; (cilia imperfect). Hind wings and cilia light ochreous-yellowish.

One specimen (*Sayer*).

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SPILOSOMA, *Stph.*

24. *Spilosoma turbida*, Butl.

Spilarctia turbida, Butl.

One specimen (*Sayer*). Butler's type is from Duke of York Island.

25. *Spilosoma marginata*, Don.

Port Moresby (*Kowald*); one specimen. Although formerly permitting *Areas*, Walk., to rank as a distinct genus, on the ground of difference in development of tongue, I am now inclined to think that no definite line can be drawn, and that the group may be with advantage merged in *Spilosoma*.

DEIOPEIA, *Stph.*

26. *Deiopeia pulchella*, L.

Port Moresby (*Kowald*); one specimen.

HYPSIDÆ.

NYCTEMERA, *Hb.*

27. *Nyctemera pellex*, L.

Port Moresby (*Kowald*); one specimen.

28. *Nyctemera mesolychna*, n. s.

♀, 48 mm. Head dark fuscous, margins of eyes and of collar ochreous-whitish. Palpi dark fuscous. Antennæ dark fuscous, bipectinated. Thorax dark fuscous, margins of patagia and of metathorax ochreous-whitish. Abdomen fuscous, segmental margins ochreous-whitish. Legs fuscous. Fore wings rather elongate-triangular, costa posteriorly moderately arched, apex obtuse, hind margin rather obliquely rounded; fuscous; veins on basal half of wing slenderly whitish; a cloudy fuscous-whitish moderate transverse fascia-like spot, reaching from near costa beyond middle to above anal angle, broadest in middle, cut by fuscous veins so as to form eight spots; cilia fuscous. Hind wings with veins 6 and 7 stalked; white; a moderate rather irregular-edged fuscous marginal band running wholly round wing, but much paler at base and on inner margin; cilia fuscous.

One specimen (*Sayer*). Appears to be to some extent

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intermediate between *N. assimilis*, Voll., and *N. trita*, Walk. (both from Java), but distinct from either.

29. *Nyctemera cribraria*, Cl.

One specimen (*Sayer*).

DREPANULIDÆ.

Teldenia, *Moore*.

Tongue developed. Palpi rather short, slender, subascending. Antennæ in ♂ shortly ciliated. Posterior tibiæ without middle-spurs. Fore wings with vein 1 simple, 2 from before middle, 5 rather approximated to 4 at base, 6, 7, and 8 out of 9, 10 connected with 9 above 7 by bar, 11 closely approximated to 10 throughout. Hind wings with vein 1*c* absent, 4 and 5 rather approximated at base, 6 from upper angle of cell, 7 rising from angulation of upper margin of cell before middle, 8 appressed to 7 for a short distance near beyond cell.

30. *Teldenia vestigiata*, Butl.

Port Moresby (*Kowald*); one specimen.

31. *Teldenia aulogramma*, n. s.

♂, 27 mm. Head, palpi, and antennæ light ochreous, crown white. Thorax, abdomen, and legs white. Fore wings triangular, costa gently arched, apex rectangular, hind margin hardly rounded, slightly oblique; white; markings light grey; a transverse streak from beneath costa at one-third to middle of inner margin, slightly sinuate below middle, marked with traces of pale ochreous dots; a straight streak from beneath costa at three-fifths to inner margin at two-thirds, marked with faint light ochreous spots; a cloudy line close beyond and parallel to this; two closely approximated lines from beneath five-sixths of costa to anal angle, almost straight, second slightly dentate so that its teeth touch first; cilia white. Hind wings white; two closely approximated ochreous-grey lines from beneath costa at two-thirds to inner margin above anal angle, rather curved outwards on lower half; a fine curved dentate ochreous-grey line from costa near before apex to anal angle; cilia white.

Port Moresby (*Kowald*); one specimen.

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LIPARIDIDÆ.

ORGYIA, *O.*

32. *Orgyia postica*, Walk.

Lacida postica, Walk., 803; Moore, Lep. Ceyl., ii., 78, pl. 109, 1; *O. Ludekingii*, Snell., Tijd. v. Ent., 1879, 104, pl. viii., 5.

Port Moresby (*Kowald*); two specimens. Also from Java and Celebes.

EUPROCTIS, *Hb.*

33. *Euproctis Moorei*, Snell.

Port Moresby (*Kowald*); one specimen.

34. *Euproctis lutea*, F.

Three specimens (*Sayer*).

35. *Euproctis gracilior*, Pag.

Porthesia gracilior, Pag., Jahrb. Nass. Ver. 1886, 30.

Port Moresby (*Kowald*); two specimens. Also from Aru.

AGARISTIDÆ.

AGARISTA, *Leach.*

36. *Agarista eurychrysa*, n. s.

♀, 59 mm. Head and thorax ochreous-yellow. Palpi, antennæ, and legs dark fuscous. Abdomen purple-blackish, three apical segments ochreous-white. Fore wings elongate-triangular, costa gently arched, slightly sinuate in middle, apex rounded, hind margin obliquely rounded; purple-blackish; a broad straight bright orange band from before middle of costa to anal angle, rather dilated towards costa; apex narrowly whitish-ochreous; cilia blackish, round apex white. Hind wings purple-blackish; a moderate bright orange apical spot, its anterior edge rounded.

One specimen (*Sayer*).

37. *Agarista neurogramma*, n. s.

♂, 45 mm. Head orange-yellow. Palpi orange-yellow, upper and lower edges and terminal joint blackish. Antennæ blackish. Thorax orange-yellow, on back mixed with whitish, collar with an interrupted blackish band, patagia with a blackish spot. Abdomen

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blackish, apical segment orange. Legs dark fuscous, middle tibiæ with an ochreous-whitish band, posterior femora and tibiæ whitish. Fore wings rather elongate-triangular, costa moderately arched, apex rounded, hind margin obliquely rounded; greenish-whitish; base narrowly blue-black; a narrow oblique blue-black fascia near base, not touching costa; a broad dirty grey-greenish cloudy band from costa before middle to inner margin before middle, somewhat mixed with blackish towards costa and inner margin; apical third blackish, bounded by a sinuate line from three-fifths of costa to anal angle, and cut by strong greenish-whitish streaks on all veins; cilia blackish. Hind wings blackish, cilia becoming whitish towards anal angle.

One specimen (*Sayer*).

ÆGOCERA, *Latr.*

38. *Ægocera cornigera*, Butl.

Port Moresby (*Kowald, Sayer*); five specimens.

NOCTUIDÆ.

HADENA, *Tr.*

39. *Hadena mniochlora*, n. s.

♂, 32 mm. Head and thorax olive-greenish, mixed with darker and lighter. Palpi light brownish-ochreous, externally dark fuscous except at apex of joints. Antennæ fuscous, moderately ciliated (1). Abdomen brownish-ochreous. Legs light brownish-ochreous, anterior and middle pair suffusedly banded with dark fuscous. Fore wings elongate-triangular, costa straight, apex obtuse, hind margin waved, rather obliquely rounded; light moss-green; a sharply dentate white line near base, anteriorly strongly margined with blackish, interrupted beneath costa; first line white, partially black-margined, irregular above, dentate on lower half; space between subbasal and first line dark olive-green, except towards costa; second line white, anteriorly black-margined, not quite reaching costa, slightly curved, with one very strong indentation below middle; space between first and second lines suffused with dark olive-green except towards margins; upper half of orbicular outlined with whitish; claviform represented by a short transverse whitish dash; space between orbicular and reniform suffused with dark fuscous; reniform subtriangular, outlined with white except on lower side; a small whitish spot, preceded and followed by blackish, on costa above reniform; a whitish mark, preceded by blackish, on costa before apex; subterminal slender,

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white, very sharply dentate throughout, teeth all touching hind margin, included triangular spaces filled with dark fuscous; cilia brownish-ochreous. Hind wings rather light brownish-ochreous, yellowish-tinged, with a light purplish-fuscous discal patch; cilia light ochreous.

One specimen (*Sayer*). This handsome species is easily recognised in the genus by its green colour and very sharply dentate white dark-edged lines.

EROSIADÆ.

EROSIA, *Gn.*

40. *Erosia conchiferalis*, Moore.

Port Moresby (*Kowald*); six specimens.

41. *Erosia theclata*, Gn.

Port Moresby (*Kowald*); one specimen.

PLUSIADÆ.

ARIOLA, *Walk.*

42. *Ariola cælisigna*, Walk.

Ariola cælisigna, Walk., 769; *A. Ransonneti*, Feld., Reis. Nov., pl. cviii., 1.

Slate Island (*Kowald*); one specimen.

BEARA, *Walk.*

43. *Beara nubiferella*, Walk.

One specimen (*Sayer*).

THALPOCHARES, *Hb.*

44. *Thalpochares Wallengreni*, Snell.

Port Moresby (*Kowald*); one specimen.

ACONTIA, *Tr.*

45. *Acontia nivipicta*, Butl.

Port Moresby (*Kowald*); four specimens.

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XANTHODES, *Gn.*

46. *Xanthodes malvæ*, Esp.

Xanthodes malvæ, Esp., Hb., Gn.; *X. stramen*, Gn., vi., 220; *Xanthia imparata*, Walk., 467; *Xanthodes inefficiens*, ib., 1752.

Two specimens (*Sayer*); these show no marked difference from the South European form.

47. *Xanthodes transversa*, Gn.

Xanthodes transversa, Gn., vi., 211, pl. x., 5; *X. migrator*, Walk., 779.

One specimen (*Sayer*).

MIAROMIMA, n. g.

Ocelli present; eyes naked; tongue developed. Antennæ in both sexes serrulate, strongly ciliated (2), in ♂ notched above basal joint, with a strong curved tooth of scales projecting from upper angle of basal joint. Palpi moderate, rather slender, ascending, loosely scaled, terminal joint rather short, pointed. Thorax and abdomen not crested. Tibiæ with dense loosely appressed scales, not spinose. Fore wings with veins 6, 7, 8 out of 9, 10 connected with 9 by bar. Hind wings with veins 3 and 4 from point, 5 approximated to 4 at base, 6 and 7 from a point.

Allied to *Acontia*, from which it differs principally by the antennal characters.

48. *Miaromima dinotis*, n. s.

♂ ♀, 29—34 mm. Head, palpi, and thorax brown-whitish, more or less irrorated or partly suffused with light brown. Antennæ fuscous. Abdomen pale whitish-ochreous, brownish-tinged. Legs rather dark brown. Fore wings elongate-triangular, costa almost straight, apex obtuse, hind margin rather obliquely rounded; brown-whitish, with a slight purple gloss, with a few minute scattered black scales; costa narrowly suffused with brown; a large curved-triangular dark coppery-brown posterior blotch, lightest towards apex of wing, base extending over whole of hind margin, apex, which is rounded and darkest, almost touches middle of inner margin, upper side in ♀ evenly rounded, in ♂ protuberant so as to nearly touch costa at three-fifths, lower side rather sharply concave; a subquadrate glossy leaden-grey spot in this patch repre-

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senting reniform, sometimes absent, becoming suffused beneath, posterior edge formed by a very fine pale line traversing patch; sometimes a small bright reddish-orange spot in disc before and beneath reniform; an indistinct irregular curved and sinuate series of cloudy blackish dots at five-sixths; a series of black dots before hind margin; cilia coppery-brown, tips brown-whitish. Hind wings in ♂ pale whitish-ochreous, with a cloudy fuscous border, in ♀ more or less suffused with fuscous throughout.

Four specimens (*Sayer*).

Risoba, *Moore*.

Ocelli present; eyes naked; tongue developed. Antennæ in both sexes ciliated, basal joint with dense projecting scales. Palpi moderate, ascending, second joint rough-scaled, terminal joint short, cylindrical. Thorax and abdomen not crested. Tibiæ with dense loosely appressed scales, not spinose. Fore wings with veins 6, 7, 8 out of 9, 10 connected with 9 by bar. Hind wings with veins 3, 4, 5 approximated, equidistant, 6 and 7 closely approximated at base.

To this genus is to be referred *repugnans*, Walk., described by Walker as a *Thyatira* on the ground of somewhat similar markings, for in structure it is of course widely dissimilar, and in no respect allied; and probably also two or three other species placed by Walker in the same genus, which I have not yet been able to examine critically.

49. *Risoba sphærophora*, n. s.

♀, 38 mm. Head dull green. Palpi pale ochreous, sides greenish-tinged. Antennæ pale ochreous, basal joint green. Thorax pale yellowish-ochreous, slightly reddish-tinged, and sprinkled with ochreous-brown. Abdomen with basal half ochreous-whitish, second and third segments blackish on sides of back, terminal half light ochreous. Legs whitish-ochreous, tarsi somewhat infuscated, middle tibiæ banded with blackish and green (anterior legs broken). Fore wings elongate-triangular, costa straight, apex obtuse, hind margin somewhat oblique, rounded, waved beneath; dull green, sprinkled with blackish; markings light yellow-ochreous, partially margined internally first with white and then with blackish; a basal patch, its outer edge running from base of costa to one-third of inner margin, slightly curved; orbicular small, round; reniform larger, round, without dark centre; a semioval spot on inner margin beyond middle,

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almost touching an irregular spot on anal angle; a large roundish apical spot, cut before its middle by a whitish line curved parallel to anterior margin, before which the ochreous colour is brighter; two faint waved blackish lines running from apical spot to inner-marginal, representing second and subterminal; a row of cloudy blackish hind-marginal marks; cilia light green, tips whitish, round apical spot wholly ochreous. Hind wings pale whitish-ochreous; a rather broad cloudy dark grey hind-marginal band, suffused with whitish-ochreous towards margins on apex and lower half of hind margin; cilia whitish-ochreous, with a basal series of dark grey marks.

One specimen (*Sayer*). Differs from *H. repugnans*, which it nearly resembles, by the green ground colour, the orbicular pale and distinct and nearer reniform, and the reniform larger and not dark-centred.

Thyrsoscelis, n. g.

Ocelli present; eyes naked; tongue developed. Antennæ in ♂ moderately ciliated (1). Palpi moderate, ascending, second joint with dense tolerably appressed scales, terminal joint short, obtuse. Thorax not crested. Abdomen in ♂ very densely hairy beneath and on sides, and with long apical hairs. Legs densely scaled, tibiæ not spinose, posterior tibiæ and three basal joints of tarsi in ♂ clothed with very dense long hairs above, in ♀ posterior tibiæ only clothed with moderate hairs above. Fore wings with veins 6, 7, 8 out of 9, 10 connected with 9 by bar. Hind wings with veins 3 and 4 stalked, 5 nearly approximated, 6 and 7 short-stalked.

50. *Thyrsoscelis iridias*, n. s.

♂ ♀, 46—48 mm. Head, palpi, antennæ, and thorax rather dark brown. Abdomen grey, apical hairs in ♂ light reddish. Legs light fuscous-reddish, sprinkled with ochreous-whitish, posterior pair reddish-whitish. Fore wings very elongate-triangular, costa slightly arched, apex obtuse, hind margin strongly bowed, very oblique; dull reddish-ochreous, suffusedly irrorated with purplish-fuscous towards inner margin and apex; lines hardly paler, first straight, posteriorly margined with purplish-fuscous, from one-fourth of costa to three-fifths of inner margin, second anteriorly margined with purplish-fuscous, from costa at three-fifths, straight and parallel to first until nearly reaching hind margin, where it is suddenly bent round to anal angle; reniform indicated in ♀ by an irregular darker suffusion; cilia reddish-

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ochreous-fuscous, tips whitish. Hind wings rather dark grey, in ♂ slightly pellucid and purplish-shining in disc and towards inner margin, in ♀ more or less suffused with whitish except towards hind margin and on veins; cilia in ♂ grey, tips white; in ♀ wholly white.

Two specimens (*Sayer*).

HULODES, *Gn.*

51. *Hulodes caranea*, Cr.

One specimen (*Sayer*).

OPHIDERES, *Boisd.*

52. *Ophideres fullonica*, L.

One specimen (*Sayer*).

ACHÆA, *Hb.*

53. *Achæa ancilla*, F.

Lagoptera magica, Hb., Gn., vii., 225.

One specimen (*Sayer*), having the hind wings more obscurely marked than usual.

54. *Achæa melicerte*, Drury.

One specimen (*Sayer*).

PSEUDOPHIA, *Gn.*

55. *Pseudophia disjungens*, Walk.

Ophiodes disjungens, Walk., 1360.

One specimen (*Sayer*). This appears to be a good species.

ENTOMOGRAMMA, *Gn.*

56. *Entomogramma torsa*, Gn.

Entomogramma torsa, Gn., vii., 204; *Hypopyra anteponens*, Walk, 1323.

One specimen (*Sayer*).

SYMPIS, *Gn.*

57. *Sympis rufibasis*, Gn.

One specimen (*Sayer*).

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Grammodes, *Gn.*

58. *Grammodes archesia*, Cr.

Remigia archesia, Cr., Gn., vii., 318; *R. virbia*, Cr.; *R. Mayeri*, Boisd., Gn., vii., 320; *R. jugalis*, Walk., 1505; *R. mutuata*, ib., 1505; *R. demonstrans*, ib., 1512; *Hypætra diffundens*, ib., Suppl., 963; *Remigia bifasciata*, ib., Suppl., 1014; *R. discrepans*, Butl., Trans. Ent. Soc. Lond., 1886, 415.

Two specimens (*Sayer*).

59. *Grammodes rigidistria*, Gn.

Ophisma rigidistria, Gn., vii., 240; *Naxia calefaciens*, Walk., 1405.

One specimen (*Sayer*).

60. *Grammodes alterna*, Walk.

Euclidia alterna, Walk., 1833; *Pseudophia nebuligera*, Butl., Trans. Ent. Soc. Lond., 1886, 413 (♀).

Four specimens (*Sayer*).

61. *Grammodes oculicola*, Walk.

Grammodes oculicola, Walk., 1446; *G. oculata*, Snell., Tijd. v. Ent. 1880, 103, pl. viii. 6.

Port Moresby (*Kowald*, *Sayer*); nine specimens.

Trigonodes, *Gn.*

62. *Trigonodes cephise*, Cr.

One specimen (*Sayer*).

Remigia, *Gn.*

63. *Remigia frugalis*, F.

One specimen (*Sayer*).

Sericia, *Gn.*

64. *Sericia diops*, Walk.

One specimen (*Sayer*).

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Erygia, *Gn.*

65. *Erygia apicalis*, Gn.

Erygia apicalis, Gn., vii., 50; *E. usta*, Walk., Suppl., 918.

Port Moresby (*Kowald*, *Sayer*); six specimens.

Phlegetonia, *Gn.*

66. *Phlegetonia conspicienda*, Walk.

Patæta conspicienda, Walk., 1748.

Two specimens (*Sayer*).

Lophoptera, *Gn.*

67. *Lophoptera squamigera*, Gn.

One specimen (*Sayer*).

Maceda, *Walk.*

68. *Maceda mansueta*, Walk.

Maceda mansueta, Walk., 1140; *Calduba obtenta*, ib., 1815.

One specimen (*Sayer*).

Ceparcha, n. g.

Ocelli present; eyes naked; tongue developed. Antennæ in ♂ moderately ciliated, in ♀ more shortly, basal joint with short tooth of scales above. Palpi moderately long, ascending, clothed with dense tolerably appressed scales, terminal joint almost as long as second, hardly more slender, obtuse. Thorax not crested, collar dense, suberect. Abdomen with two small dorsal crests near base. Tibiæ densely scaled, rather rough above, not spinose. Fore wings with veins 7 and 8 out of 9, 10 connected by bar with 9, surface with tufts of raised scales. Hind wings with veins 3 and 4 stalked, 5 nearly approximated, 6 and 7 approximated at base.

69. *Ceparcha cymatistis*, n. s.

♂ ♀, 32—35 mm. Head white sprinkled with fuscous. Palpi fuscous sprinkled with white. Antennæ fuscous. Thorax white, with three slender ill-defined transverse fuscous bars. Abdomen

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grey-whitish. Legs dark grey, tibiæ irrorated with white, apex of tarsal joints white. Fore wings elongate-triangular, costa gently arched, sinuate in middle, apex obtuse, hind margin hardly oblique, somewhat rounded; white, more or less wholly suffused with pale greyish-ochreous except on costa; costa very narrowly spotted with dark fuscous, with a larger cloudy spot about middle; first line slender, dark fuscous, hardly traceable except in disc, where it makes a very strong dentation below middle; second line slender, dark fuscous, with a series of blackish dots forming teeth on posterior edge, from two-thirds of costa to three-fourths of inner margin, slightly curved outwards, sinuate beneath costa; subterminal indicated by some faint darker clouds; cilia fuscous, basal half barred with whitish. Hind wings whitish, apex broadly suffused with rather dark fuscous, attenuated to a point above anal angle; cilia fuscous, tips whitish.

Four specimens (*Sayer*).

Homodes, *Gn.*

70. *Homodes iomolybda*, n. s.

♂, 29 mm. Head, palpi, antennæ, thorax, and abdomen orange-ferruginous. Legs ochreous-yellowish, tibiæ suffused with ferruginous. Fore wings triangular, costa slightly arched, apex obtuse, hind margin waved, rather obliquely rounded; ferruginous-orange, costa and inner margin more reddish; a dark purple leaden-metallic dot beneath costa near base, a second beneath it, and a third beneath costa at one-fifth; four dark purple leaden-metallic slender lines; first from one-fourth of costa to one-third of inner margin, somewhat irregular; second nearly parallel to first; third from middle of costa to two-thirds of inner margin, strongly curved outwards, rather irregularly subdentate; fourth near and parallel to hind margin, interrupted on veins, margined anteriorly with deeper orange; a faint purplish shade near beyond and parallel to third line; a submarginal series of subcrescentic black marks between veins; a fine black hind-marginal line; cilia light ferruginous-reddish. Hind wings with ground colour and markings as in fore wings, but dots near base and first line absent; third line less curved, shade following it marked with two or three faint grey spots.

Dinner Island, in July (*Kowald*); one specimen.

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Ctypansa, *Walk.*

71. *Ctypansa mesogramma*, n. s.

♂, 42—43 mm. Head and palpi dark ochreous-brown. Antennæ pale greyish-ochreous, becoming brown towards base. Thorax brown, anterior margin sharply dark ochreous-brown. Abdomen brown, anal hairs whitish-yellowish. Legs brown, tarsi ringed with whitish-yellowish. Fore wings rather elongate-triangular, costa gently arched, apex obtuse, hind margin obliquely rounded; purplish-brown; a line near base, and first and second lines rather darker, ill-marked, slender, irregularly dentate; median shade very strongly marked, dark brown; lower half of reniform represented by a small roundish black spot; subterminal represented by an irregular series of minute whitish dots, preceded by small blackish wedge-shaped dots; cilia fuscous, tips paler. Hind wings with ground colour, median shade, second and subterminal lines as in fore wings, but much less distinctly marked.

Two specimens (*Sayer*). Closely allied to *C. bocanidia*, Butl., but readily separated by the well-defined median shade, and black discal spot; in *C. bocanidia* the former is very obscurely suffused, the latter represented by a minute dot.

Simplicia, *Gn.*

72. *Simplicia cænealis*, Walk.

Sophronia cænealis (*-neusalis*), Walk., Delt., 94; *Bocana turpatalis*, ib., 174; *Herminia sicca*, Butl., Ill. Het., iii., 62, pl. lvi., 7.

Two specimens (*Sayer*). Occurs also in Eastern Australia, China, Japan, Hawaii, and the Solomon Islands.

Hypena, *Tr.*

73. *Hypena isogona*, n. s.

♂, 33 mm. Head, palpi, antennæ, thorax, abdomen, and legs rather dark fuscous. Fore wings triangular, costa slightly sinuate, apex obtuse, hind margin waved, bowed, somewhat oblique; purplish-fuscous, irrorated with darker fuscous; a dark fuscous dot near base; first line paler, ill-defined, sinuous; a blackish dot, margined posteriorly by an ochreous-whitish dot, in disc at one-third; second line slender, whitish-ochreous, sharply defined, from three-fifths of costa to three-fifths of inner margin, forming three equal concave sinuations, separated by two angular pro-

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jections, upper obtuse, lower acute; lower two-thirds of second line bordered anteriorly by a broad dark fuscous suffusion, not extending to first line; a downwards-angulated whitish-ochreous line from near apex of wing to near upper angle of second line, suffusedly margined beneath with blackish-fuscous; two small blackish-fuscous spots transversely placed above this, posteriorly margined with ochreous-whitish; a blackish-fuscous dot below its anterior extremity; a faintly indicated paler irregular subterminal line from beneath its anterior extremity to anal angle; an interrupted darker hind-marginal line; cilia fuscous. Hind wings and cilia fuscous; a darker hind-marginal line.

One specimen (*Sayer*).

Britha, *Walk.*

74. *Britha biguttata*, Walk.

Britha biguttata, Walk., Suppl., 1146; *Herminia incertalis*, ib., 1518.

One specimen (*Sayer*).

Acrarmostis, n. g.

Forehead with projecting cone of scales; ocelli present; eyes naked; tongue developed. Antennæ in ♂ bipectinated, apex filiform. Palpi rather long, porrected, second joint with very dense projecting scales above and beneath, where they form a short apical tuft, terminal joint short, obtuse. Thorax with a very small crest at posterior extremity. Abdomen without crests. Tibiæ with appressed scales, not spinose. Fore wings in ♂ with costa thickened on anterior half and a subcostal groove beneath thickened portion on lower surface; vein 7 out of 9 near base, 8 out of 9, 10 out of 9 below 8, 11 anastomosing with 9 and base of 10. Hind wings with vein 5 parallel to 4, 6 and 7 stalked.

75. *Acrarmostis dryopa*, n. s.

♂, 21 mm. Head and thorax pale ochreous, with a few fuscous scales. Palpi dark fuscous, internally and at apex of joints pale ochreous. Antennæ whitish, pectinations dark fuscous. Abdomen ochreous-whitish. Legs whitish-ochreous, more or less wholly suffused with dark fuscous. Fore wings elongate-triangular, costa slightly arched, sinuate in middle, apex obtuse, hind margin obliquely rounded; pale brownish-ochreous, suffusedly irrorated with fuscous; a dark fuscous streak along basal fourth of costa,

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containing some whitish-blue scales; a cloudy fuscous streak from costa before apex to beyond middle of inner margin, containing a series of irregular blackish marks, and marked with indistinct dots of whitish-blue scales, somewhat sinuate inwards on lower half; a hind-marginal series of triangular dark fuscous marks; cilia whitish-ochreous mixed with fuscous. Hind wings ochreous-whitish; an indistinct pale fuscous sinuate post-median line, obsolete above middle; an interrupted dark fuscous hind-marginal line; cilia whitish-ochreous.

One specimen (*Sayer*).

LARENTIADÆ.

DOLEROSCELES, n. g.

Face with short cone of scales. Antennæ in ♂ ciliated. Palp moderate, porrected, rough-scaled. Posterior tibiæ in both sexes without median spurs. Fore wings with areole simple, 11 sometimes running into 12. Hind wings with veins 6 and 7 stalked.

This genus, closely allied both to *Pasiphila* and *Eupithecia*, is at once separated from both by the absence of the median spurs of posterior tibiæ. Besides the two following species I have certainly a third, but not in condition to be described.

76. *Dolerosceles erymna*, Meyr.

Eupithecia erymna, Meyr., Trans. Ent. Soc. Lond. 1886, 192.

One specimen (*Sayer*).

77. *Dolorosceles bryoscopa*, n. s.

♀, 18 mm. Head, palpi, and thorax pale ochreous, spotted with dark fuscous. Antennæ light greyish-ochreous. Abdomen pale ochreous, base of segments and a band before middle suffusedly dark fuscous. Legs whitish-ochreous, unspotted. Fore wings with costa gently arched, distinctly sinuate in middle, hind margin rather strongly rounded; 11 running into 12; pale greenish-ochreous, with a few scattered black scales; basal area occupied by four or five cloudy dark fuscous curved dentate transverse lines mixed with silvery-whitish scales; a silvery-whitish median line from costa before middle to middle of inner margin, rather strongly angulated outwards in disc, connected with preceding dark lines by dark fuscous blotches above and below angle; these blotches

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afterwards continued as broad cloudy longitudinal streaks to hind margin above middle and to anal angle respectively; second line fine, silvery-whitish, irregularly sinuate and curved, moderately angulated in middle and at one-fourth from costa, margined on both sides with dark fuscous, anteriorly forming a cloudy suffusion tending to be produced in wedge-shaped streaks along veins; a slender regularly dentate silvery-whitish subterminal line, beyond which hind margin is dark fuscous on upper half; cilia whitish-ochreous, barred with dark fuscous. Hind wings with hind margin rounded; colour and markings as in fore wings, but lines on basal area obsolete, median line straight.

Port Moresby (*Kowald*); one specimen.

Remodes, *Gn.*

78. *Remodes melanoceros*, n. s.

♀, 80 mm. Head and thorax light dull green, with a white spot behind eyes. Palpi 3, dull green, base white beneath. Antennæ blackish-grey, extreme base ochreous-whitish. Legs pale greyish-ochreous (abdomen and posterior legs broken). Fore wings with costa rather strongly arched, hind margin strongly rounded, very oblique; pale dull whitish-green, with about fourteen subdentate more or less curved deeper green transverse lines, partially and irregularly marked with black; a black discal dot before middle; a hind-marginal series of large black dots; cilia ochreous-whitish. Hind wings small, narrow, hind margin rounded; whitish-ochreous-grey.

Port Moresby (*Kowald*); one specimen. I have it also from Queensland. Closely allied to *R. elaica*, Meyr., but readily separated by the wholly blackish antennæ.

MONOCTENIADÆ.

I propose to apply this name to the family formerly termed *Œnochromidæ*, as on recent revision of the genera I find that the genus *Œnochroma*, Gn., is non-existent, being only a synonym of *Monoctenia*.

Eumelea, *Jard.*

79. *Eumelea florinata*, Gn.

One specimen (*Sayer*).

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DESMOBATHRIDÆ.

Desmobathra, *Meyr.*

80. *Desmobathra macariata*, Walk.

Zarmigethusa macariata, Walk., 1637; *Macaria elongaria*, Snell., Tijd. v. Ent., 1881, 86, pl. x., 3.

Port Moresby and Dinner Island (*Kowald*); four specimens. Snellen cannot have examined the structure of this species, which is in all respects widely remote from *Macaria*.

Celerena, *Walk.*

I formerly failed to observe the subbasal bar of vein 8 in the hind wings, but have since found it to be present in all species; the genus is therefore certainly referable here.

81. *Celerena proxima*, Walk.

Port Moresby (*Kowald*); one specimen.

STROPHIDIADÆ.

Strophidia, *Hb.*

82. *Strophidia bifasciata*, Butl.

Port Moresby (*Kowald*); one specimen.

Stesichora, *Meyr.*

83. *Stesichora justaria*, Walk.

Micronia justaria, Walk., 821; *M. adjudicataria*, ib., 822; ? *M. tristriata*, Pag., Jahrb. Nass. Ver., 1886, 55.

♂ ♀, 52—54 mm. Head, thorax, and legs white; face blackish. Palpi blackish, second joint white beneath, terminal joint long, apex swollen. Antennæ grey, base white. (Abdomen broken.) Fore wings with costa rather strongly arched, hind margin scarcely rounded, rather oblique; white, with slender thinly strewn pale brownish transverse strigulæ on basal two-thirds and a subterminal narrow space; costa marked with from sixteen to twenty short black strigulæ; three pale brownish streaks parallel to hind margin, not reaching costa, at one-third, beyond middle, and three-fourths; a fine black hind-marginal line; cilia grey-whitish. Hind wings with hind margin angulated and produced into an

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acute triangular tooth in middle; white; subterminal strigulæ as in fore wings, but only a few towards base of wing; transverse streaks as in fore wings, but first only slightly indicated, third bent round beneath so as to nearly approach second; a black hind-marginal line, thickened on veins, interrupted on tooth; a round black subterminal spot opposite tooth, and a small longitudinal wedge-shaped black mark in tooth; cilia grey-whitish.

Port Moresby (*Kowald, Sayer*); two specimens. Also from New Ireland.

84. *Stesichora teriadata*, Gn.

Micronia teriadata, Gn., x., 29; *M. ceramata*, Walk., 1624.

Port Moresby (*Kowald, Sayer*); three specimens.

GEOMETRIDÆ.

Mnesterodes, n. g.

Face smooth. Palpi short, slender, porrected, loosely scaled. Antennæ in ♂ flatly dentate, strongly ciliated. Posterior tibiæ in ♂ flattened, without spurs, tarsi much aborted. Fore wings with vein 6 remote from 9, 10 out of 9 below 8, 11 anastomosing with 9. Hind wings with veins 6 and 7 stalked; in ♂ with a large glandular swelling beneath in middle of disc, and a long expansible pencil of hairs from base of costa above.

A development of the first group of *Acidalia*, from which it differs by the abnormal structures of hind wings.

85. *Mnesterodes trypheropa*, n. s.

♂, 11—12 mm. Head, thorax, and abdomen pale ochreous, face and palpi rather dark fuscous. Antennæ and legs whitish-ochreous, posterior tarsi one-third. Fore wings with costa slightly arched, hind margin rounded, rather strongly oblique; pale brownish-ochreous; lines cloudy, fuscous-purplish, only apparent on upper half of wing; first indistinct, median absent, second and subterminal closely approximated, submarginal absent; a well-marked cloudy fuscous-purplish discal spot; cilia whitish-ochreous. Hind wings rounded, inner margin very short, anal angle somewhat prominent; bright silver-metallic, with a moderate pale ochreous border; a purplish-fuscous spot at anal angle; costal pencil ochreous-yellow; cilia whitish-ochreous. Fore wings

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beneath silvery-metallic on lower half; glandular swelling of hind wings rather dark fuscous.

Port Moresby (*Kowald*); two specimens. A curious and very elegant species.

Xenocentris, n. g.

Face smooth. Palpi short, slender, porrected. Antennæ in ♂ bidentate, ciliated with very long fascicles. Abdomen in ♂ with extremely large expansible tufts of hairs on genitalia. Middle tibiæ and much elongated basal joint of tarsi in ♂ clothed with long dense rough hairs above, inner spur very long and thick and clothed with dense rough hairs above; posterior tibiæ in ♂ very short, without spurs, tarsi bent, abbreviated. Fore wings with vein 6 remote from 9, 10 out of 9 below 8, 11 anastomosing with 9. Hind wings with veins 3 and 4 stalked, 6 and 7 stalked.

Also a development of the first group of *Acidalia*, specially characterised by the peculiar middle legs; the extreme development of the genital tufts is noteworthy, but probably less reliable as a generic character.

86. *Xenocentris rhipidura*, n. s.

♂, 14 mm. Head, palpi, thorax, and abdomen pale whitish-ochreous, mixed with pale reddish; face dark fuscous, fillet ochreous-whitish; genital tufts pale whitish-ochreous. Fore wings with costa almost straight, hind margin bowed, rather oblique; pale whitish-ochreous, suffusedly irrorated with pale crimson; first and second lines represented by irregular series of blackish dots; a transverse dark grey discal dot; faint traces of paler subterminal and submarginal lines; cilia whitish-ochreous, crimson-tinged. Hind wings with hind margin rounded; colour and markings as in fore wings, but first line obsolete, pale lines more distinctly indicated; an interrupted dark crimson-fuscous hind-marginal line.

Port Moresby (*Kowald*); one specimen.

Acidalia, *Tr.*

87. *Acidalia albicostata*, Walk.

Port Moresby (*Kowald*); one specimen. Common in Eastern Australia.

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88. *Acidalia homodoxa*, Meyr.

Port Moresby (*Kowald, Sayer*); seven specimens. In the British Museum collection specimens of this species from the Solomon Islands have been placed under *A. impersonata*, Walk., with which, however, they are by no means identical.

89. *Acidalia parasira*, n. s.

♂ ♀, 20—23 mm. Head yellow-ochreous, fillet whitish, face blackish-fuscous. Palpi ascending, blackish-fuscous, beneath whitish-ochreous. Antennæ whitish-ochreous, in ♂ serrate, ciliations 2. Thorax and abdomen pale whitish-ochreous, collar tinged with yellow-ochreous. Legs whitish-ochreous, anterior pair somewhat infuscated; posterior tibiæ in ♂ much dilated, rough-scaled above, without spurs, in ♀ with all spurs present, posterior tarsi in ♂ three-fifths. Fore wings with costa posteriorly moderately arched, hind margin waved, rounded, rather oblique; whitish-ochreous, with some fine scattered black scales; lines darker ochreous; first from one-third of costa to one-third of inner margin, angulated beneath costa, often very indistinct; a black discal dot, much before median; median from two-thirds of costa to beyond middle of inner margin, more or less cloudy, sometimes dentate, slightly curved, sinuate inwards above middle and above inner margin; second from four-fifths of costa to three-fourths of inner margin, slightly curved, slender, dentate, often marked with grey dots on dentations, sinuate inwards above middle and above inner margin; subterminal paler, cloudy, ill-defined; submarginal very faint, cloudy; a hind-marginal series of black dots; cilia pale whitish-ochreous. Hind wings with hind margin rounded; veins 6 and 7 short-stalked; colour, second line, and posterior markings as in fore wings; median line as in fore wings but straight, and before middle; a black discal dot near beyond this.

Port Moresby, Slate and Dinner Islands (*Kowald*); six specimens. Belongs to the second group of the genus, and to the immediate neighbourhood of *A. recessata*, to which it is closely allied, differing in the relatively longer posterior tarsi of ♂, the more ochreous markings and head, less oblique median line, and other details.

90. *Acidalia recessata*, Walk.

One specimen (*Sayer*). Common throughout Eastern Australia.

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91. *Acidalia crossophragma*, Meyr.

Port Moresby (*Kowald*); one specimen.

Prasonesis, n. g.

Face smooth. Palpi short, ascending, slender, with appressed scales. Antennæ in ♂ ciliated. Posterior tibiæ with all spurs present. Fore wings with vein 6 remote from 9, 10 out of 9, anastomosing with 11 and then very strongly with 9. Hind wings with veins 6 and 7 separate.

Nearest to *Dithalama*, which it closely approaches in neuration, differing mainly in the presence of all spurs on posterior tibiæ.

92. *Prasonesis microphylla*, n. s.

♂, 28 mm. Face dark reddish-fuscous, lower part pale ochreous, fillet blackish, crown yellow-ochreous. Palpi whitish-ochreous, above dark fuscous. Antennæ fuscous, ciliations three-fourths. Thorax white. Abdomen whitish-ochreous, becoming white towards base. Legs pale ochreous, anterior pair brownish-tinged, posterior pair whitish-ochreous. Fore wings with costa posteriorly moderately arched, hind margin waved, bowed, rather oblique; whitish-ochreous, anterior half sprinkled with black, posterior half somewhat suffused with pale reddish-ochreous, especially immediately beyond posterior fascia; costal edge brown-reddish; a black subcostal irroration from middle to near apex, attenuated posteriorly; first line indicated by four black dots; a rather narrow very irregular deep green fascia from beneath costa at four-fifths to inner margin at two-thirds, edged first with black and then with white, rectangularly broken inwards above middle, upper portion attenuated to a point above, margins twice sinuate, lower portion with a triangular indentation above its middle on anterior side, and a large triangular emargination below its middle on posterior side, lower extremity narrowed; a dark grey hind-marginal line, forming small spots between veins; cilia whitish-ochreous, reddish-tinged. Hind wings with hind margin waved, rounded, slightly bent in middle; colour, hind-marginal line, and cilia as in fore wings; an indistinct cloudy purplish median line, nearly straight; second line parallel to hind margin, sinuate inwards above middle, grey and indistinct on upper half, blackish on lower half, where it is followed by five small semi-oval more or less connected deep green spots, edged posteriorly first with black and then with white.

Port Moresby (*Kowald*); one specimen.

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PERIXERA, *Meyr.*

93. *Perixera syntona*, n. s.

♂, 39 mm. Head whitish-ochreous, upper part of forehead fuscous. Palpi whitish-ochreous, above dark fuscous, terminal joint moderate. Antennæ whitish-ochreous, pectinations *a* 5, *b* 9. Thorax and abdomen whitish-ochreous, sprinkled with black. Legs whitish-ochreous. Fore wings with costa slightly arched, hind margin waved, rounded, rather oblique; vein 11 out of 9; pale whitish-ochreous, slightly brownish-tinged, finely sprinkled with black; a black dot in disc before middle; second line represented by an irregular series of blackish dots from five-sixths of costa to three-fourths of inner margin, with traces of a faint connecting fuscous shade, sharply indented above middle; a hind-marginal row of blackish dots between veins; cilia pale whitish-ochreous. Hind wings with hind margin rounded, crenulate; colour and markings as in fore wings, but discal black dot much larger and transverse.

Port Moresby (*Kowald*); one specimen.

94. *Perixera obrinaria*, Gn.

Ephyra obrinaria, Gn., ix., 414; *Anisodes obliviaria*, Walk., 643; *A. similaria*, ib., 1582; *A. caligata*, ib., 1584; *A. suspicaria*, Snell., Tijd. v. Ent., 1881, 80, pl. viii., 6.

Port Moresby (*Kowald*); two specimens. Occurs also in India, Ceylon, Celebes, and Solomon Islands.

95. *Perixera nephelospila*, n. s.

♀, 37 mm. Head and antennæ whitish-ochreous, upper half of face fuscous-crimson. Palpi long, whitish-ochreous, above fuscous-crimson, terminal joint long. Thorax pale brownish-ochreous. (Abdomen broken.) Legs whitish-ochreous, anterior and middle femora suffused with dull crimson above. Fore wings with costa slightly arched, faintly sinuate in middle, hind margin waved, rounded, oblique; 11 anastomosing with 9, 1 *a* and 1 *b* connected by a short bar near base; light ochreous, finely irrorated with blackish scales shaded with pale fuscous; first line indicated by three black dots; second line represented by an irregular series of blackish dots from four-fifths of costa to three-fourths of inner margin, followed on lower third by a cloudy blackish-fuscous blotch extending to inner and hind margin, but leaving an ill-defined pale

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anal spot; a hind-marginal row of blackish dots between veins; cilia whitish-ochreous. Hind wings with hind margin waved, rounded; colour and markings as in fore wings, but first line obsolete; a small white unmargined discal spot.

One specimen (*Sayer*). I should be inclined to suspect that the peculiar structure of veins 1*a* and 1*b* is merely an individual abnormality and not a specific character. The dark anal blotch is probably also variable, as in allied species.

Timandra, *Dup.*

96. *Timandra hemichroa*, n. s.

♀, 22 mm. Head and antennæ pale ochreous, slightly reddish-tinged, fillet white. Palpi ochreous-whitish. Thorax whitish-ochreous, slightly greenish-tinged. Abdomen ochreous-whitish, rosy-tinged. Legs pale whitish-ochreous. Fore wings with costa hardly arched, apex almost acute, hind margin bowed, oblique; pale dull green, transversely strigulated with darker; first line straight, whitish, from one-fourth of costa to one-third of inner margin; a small black discal spot; median line rather thick, straight, reddish-whitish, from four-fifths of costa to two-thirds of inner margin; second line indicated by an irregular darker greenish suffusion, marked with two or three indistinct blackish dots; cilia reddish-whitish. Hind wings with hind margin strongly angulated in middle; pale dull whitish-reddish, transversely strigulated with dark grey; median line slightly paler, straight; second line indicated by a curved series of blackish dots; cilia pale whitish-reddish.

Port Moresby (*Kowald*); one specimen.

97. *Timandra molybdias*, n. s.

♀, 26 mm. Head and palpi ferruginous, fillet whitish. Antennæ whitish-ochreous. Thorax and abdomen pale dull greenish. Legs whitish-ochreous, anterior coxæ and femora rosy. Fore wings with costa posteriorly moderately arched, apex acute, hind margin oblique, rather deeply concave on upper half, angularly projecting in middle, lower half straight; pale dull ochreous-greenish; costal edge pale ochreous-reddish on anterior half; a small round leaden-grey discal spot; a straight ochreous-yellow line, anteriorly edged with a darker shade of ground colour and posteriorly obscurely with ochreous-whitish, from costa near apex to inner margin beyond middle; a fuscous-reddish hind-marginal line, on upper

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half broader and marked with dark fuscous; cilia reddish-brown, tips pale ochreous. Hind wings with hind margin angulated in middle, forming a moderate triangular projection; colour and cilia as in fore wings; a small white grey-circled discal dot; a straight line, as in fore wings, from middle of costa to middle of inner margin; a fuscous-reddish hind-marginal line.

Port Moresby (*Kowald*); one specimen. Closely allied to *T. aventiaria*, of which it might possibly be a form, but the differences in cilia and ground colour separate it from any specimens which I have seen.

EUCROSTIS, *Hb.*

98. *Eucrostis halcyone*, n. s.

♂, 18 mm. Face bright orange, fillet and post-orbital rims white, crown pale yellowish. Palpi white. Antennæ white, pectinations *a* 5, *b* 8. Thorax whitish-green. (Abdomen defaced.) Legs white, anterior pair whitish-ochreous. Fore wings with costa gently arched, hind margin gently rounded, rather oblique; vein 6 separate, 11 free; very pale green; a white costal streak from near base to three-fifths, attenuated at extremities, margined beneath by a yellowish subcostal streak, which extends from base to near apex of wing; lines faintly indicated, slender, whitish, irregularly dentate, but hardly traceable; cilia whitish-yellowish, tips whitish. Hind wings with hind margin rounded; veins 3 and 4 separate, 6 and 7 stalked; colour, lines, and cilia as in fore wings.

Port Moresby (*Kowald*); one specimen.

99. *Eucrostis calliptera*, n. s.

♂, 23 mm. Face and extreme back of crown bright green, rest of crown and fillet white. Palpi green, beneath white, terminal joint short. Antennæ white, pectinations *a* 6, *b* 9. Thorax white, collar bright green. Abdomen white, basal third partly green on back. Legs white, apex of tibiæ spotted with dark fuscous. Fore wings with costa gently arched, hind margin rounded, rather oblique; vein 6 from point with 9, 11 free; bright yellowish-green; costa narrowly white from one-fourth to four-fifths; a triangular white spot on base of wing; a dark reddish-fuscous discal dot at two-fifths, surrounded by a faint whitish ring; lines slender, white; first from beneath costa at one-fourth to inner margin at one-third, angulated below middle; second from two-thirds of costa to two-thirds of inner margin, upper half rather dentate, angulated at

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three-fourths from costa; an indistinct white subterminal line from apex to anal angle, touching hind margin in middle, upper half curved inwards, lower half thrice sinuate; space between second and subterminal lines on upper half, and beyond subterminal line towards apex suffused with whitish; a pale reddish semicircular anal blotch, anteriorly bounded by second line, including a blackish ring occupying anal angle; a white hind-marginal line, marked with a black dot in middle and another above anal blotch; cilia pale green, tips whitish. Hind wings with hind margin obtusely bent; veins 3 and 4 stalked, 6 and 7 stalked; bright yellowish-green; three or four indistinct white strigulæ on basal half; second line white, subdentate, strongly curved; subterminal similar but very indistinct; space between second line and hind margin pale reddish on upper half, sprinkled with blackish, including an elongate semi-oval white marginal spot at apex, and a ferruginous spot below this; a cloudy whitish anal blotch, extending to second line; a white hind-marginal line, marked with three or four blackish dots about middle, and another at anal angle; cilia round apex white, thence to middle pale reddish mixed with ferruginous, lower half pale green, tips whitish.

Port Moresby (*Kowald*); one specimen. This species so closely approaches *partita*, Walk., that it also is doubtless referable to *Eucrostis*; I formerly placed it in *Iodis* provisionally, but without examination of structure, having only seen the British Museum specimens. *E. calliptera* is a much smaller and more neatly-marked insect than *E. partita*, and the palpi are green, not dark reddish-fuscous; the pectinations of the antennæ are relatively much longer; the latter point appears conclusive as to their specific distinctness.

Comostola, *Meyr.*

To the generic characters should be added: Posterior tibiæ in ♂ with all spurs present. Fore wings with veins 3 and 4 sometimes stalked, 11 anastomosing with 12 or free.

100. *Comostola conchylias*, n. s.

♂, 19 mm. Head deep red mixed with blackish, fillet white, lower part of face whitish. Palpi whitish, terminal joint moderate. Antennæ whitish-ochreous, pectinations *a* 6, *b* 8. Thorax bright green, shoulders narrowly deep red. Abdomen white, sides of back closely irrorated with reddish and blackish. Legs whitish-ochreous. Fore wings with costa moderately arched, hind margin

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rounded, rather oblique; 8 and 4 from a point, 11 not anastomosing with 12; green; a rather narrow iridescent white border along costa and hind margin throughout, margined exteriorly first with rosy and then with iridescent blue-black, interiorly first with iridescent blue-black and then with brown-red, its inner edge on costa forming a moderate projecting tooth before middle and two shorter ones between this and apex, on hind margin irregularly subdentate, forming a moderate projection upwards at anal angle; cilia pale yellowish. Hind wings with hind margin rounded; colour, hind-marginal border, and cilia as in fore wings, but without anal projection.

Port Moresby (*Kowald*); one specimen. *C. dispansa*, Walk., is very near this, but differs by the possession of a discal spot above anal projection in fore wings.

101. *Comostola pyrrhogona*, Walk.

Eucrostis pyrrhogona, Walk., Suppl., 1610.

♀, 18—19 mm. Head reddish-orange, fillet paler, its posterior margin sometimes black, lower part of face whitish. Palpi reddish-ochreous, beneath white, terminal joint long. Antennæ whitish-ochreous. Thorax pale blue-green, with a posterior orange spot. Abdomen pale blue-greenish, on back ferruginous-orange, with two partly confluent blue-black longitudinal lines. Legs whitish-ochreous, anterior pair suffused with bright rosy, posterior tibiæ whitish. Fore wings with costa hardly arched, hind margin rather strongly rounded, oblique; 8 and 4 stalked, 11 sometimes anastomosing with 12; light blue-green; a moderate somewhat irregular ferruginous-orange streak along costa, mixed with shining blackish scales; a moderate deep red hind-marginal border, its inner edge strongly waved, bisected by a shining black line, of which anterior edge is also waved, posterior portion sometimes paler and more ochreous; anterior indentations of this border filled with whitish; a small red spot on its posterior extremity, forming a projection upwards; a hind-marginal row of black dots; cilia ochreous-yellow, base with a few black scales on hind-marginal dots. Hind wings with hind margin rounded; colour, hind-marginal markings, and cilia as in fore wings, but without anal projection.

Port Moresby (*Kowald*); two specimens.

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102. *Comostola nereidaria*, Snell.

Iodis nereidaria, Snell., Tijd. v. Ent., 1881, 76, pl. x., 10, 11.

One specimen (*Sayer*).

103. *Comostola rubrolimbaria*, Gn.

Amaurinia rubrolimbaria, Gn., ix., 386.

Port Moresby (*Kowald*); one specimen. In the fore wings veins 3 and 4 are stalked, 11 anastomoses with 12.

IODIS, *Hb.*

104. *Iodis neomela*, n. s.

♀, 22—25 mm. Face light dull reddish, fillet white, crown light green. Palpi pale reddish, beneath white, terminal joint moderately long. Antennæ ochreous-white. Thorax light green. Abdomen light green, sides and apex white. Legs ochreous-whitish. Fore wings with costa gently arched, hind margin hardly rounded, rather oblique; 3 and 4 approximated at base, 6 out of 9, 11 free; rather light yellowish-green; costa narrowly ochreous-whitish from base to near apex; a slender slightly sinuate whitish line from beneath costa at one-fifth to one-third of inner margin; a moderately straight ochreous-whitish line, slightly bent at upper extremity, from beneath costa at two-thirds to inner margin at three-fifths; cilia pale whitish-ochreous. Hind wings with hind margin bent on vein 4, slightly rounded; 3 and 4 stalked; colour and cilia as in fore wings; a straight ochreous-whitish line from three-fifths of costa to three-fifths of inner margin.

Port Moresby (*Kowald*); two specimens.

105. *Iodis albicosta*, Walk.

Port Moresby (*Kowald*); one specimen.

106. *Iodis aphrias*, n. s.

♂, 26 mm. Head white, upper part of face green, posterior margin of crown fuscous. Palpi ochreous, beneath white, terminal joint moderately long. Antennæ ochreous, stalk dotted with white, pectinations 4. Thorax green, with a large posterior white spot. Abdomen white, towards base green on back. Legs white, anterior tibiæ and tarsi brownish-ochreous ringed with white. Fore wings with costa moderately arched, hind margin waved, rounded,

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oblique; 3 and 4 separate, 6 from a point with 9, 11 free; light bluish-green, thinly scaled (colour formed by green hair-scales on a transparent whitish ground), with a few small scattered white strigulæ; a rather broad white costal border, strigulated with ochreous-brown, lower edge with a projection before middle, representing discal spot; lines slender, indistinct, partially interrupted, white; first from one-fourth of costa to two-fifths of inner margin, hardly curved; second from three-fourths of costa to three-fourths of inner margin, irregularly parallel to hind margin, but sinuate outwards below middle; a quadrate white blotch on middle of hind margin, touching second line, cut by two irregular fuscous transverse lines; a triangular white spot on inner margin following second line, irregularly margined with fuscous; a hind-marginal row of white dots on veins; cilia white, faintly barred with pale brownish. Hind wings with hind margin rounded, waved, with a prominent rounded tooth in middle; 3 and 4 stalked; colour and second line as in fore wings; a subquadrate apical white blotch, containing a central fuscous spot with a fuscous mark on each side of it; a white subquadrate blotch on middle of hind margin, anteriorly including a horseshoe-shaped fuscous mark.

Port Moresby (*Kowald*); one specimen.

107. *Iodis pieroides*, Walk.

Two specimens (*Sayer*).

108. *Iodis lithocrossa*, n. s.

♂, 29 mm. Head bright green, fillet broadly white. Palpi moderate, whitish, second joint green above. Antennæ light fuscous, stalk mostly white, pectinations 3½. Thorax bright green, dotted with white posteriorly. Abdomen green, with a row of white dorsal spots, apex and sides posteriorly white. Legs white, anterior femora and tibiæ orange above, anterior tarsi light fuscous. Fore wings with costa moderately arched, hind margin waved, rounded, rather oblique; 3 and 4 separate, 6 separate, 11 free but bent to approach 12 in middle; bright emerald-green; costa slenderly white, strigulated with dark fuscous; lines slender, white, interrupted, indistinct; first from one-fourth of costa to two-fifths of inner margin, somewhat curved, rather dilated on margins; second from three-fourths of costa to three-fourths of inner margin, subdentate, roughly parallel to hind margin, sinuate inwards beneath costa and above inner margin, lower extremity forming a small spot; a narrow white transverse discal mark before

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middle; a subterminal series of small white spots; a hind-marginal row of white dots, connected by a darker green line; cilia green, base indistinctly spotted with white, tips whitish. Hind wings with hind margin rounded, waved, with prominent rounded tooth in middle; 3 and 4 stalked; colour, second line, subterminal and hind-marginal dots, and cilia, as in fore wings; anterior half more or less dotted and strigulated with white, especially towards inner margin; second line forming a small spot on costa; subterminal and hind-marginal dots opposite median tooth enlarged into small spots.

♀, 30 mm. Head, thorax, abdomen, and legs as in ♂; anterior tibiæ and tarsi browner. Palpi ochreous-yellow, beneath white, terminal joint longer, fuscous. Antennæ light fuscous, becoming white towards base. Fore wings formed as in ♂, but 11 anastomosing with 12; bright rather deep emerald-green; costa narrowly pale brownish-ochreous, strigulated with fuscous; first line apparently obsolete, but perhaps defaced; second line slender, whitish, from three-fourths of costa to three-fourths of inner margin, strongly curved outwards so as to approach hind margin below middle, sharply sinuate inwards beneath costa, and less sharply above inner margin; a brown hind-marginal border, mixed with light ochreous, and obscurely marked with whitish on veins, occupying whole space between second line and hind margin except a green spot in subcostal sinuation of line, and including a cloudy whitish subapical spot; an interrupted dark brown hind-marginal line; cilia pale brown, mixed with whitish-ochreous. Hind wings formed as in ♂; colour, second line, hind-marginal band, and cilia as in fore wings, but second line only slightly sinuate beneath costa, no green spot in sinuation, or subapical white spot; a small white cloudy spot occupying hind-marginal tooth.

Dinner Island (*Kowald*); two specimens. I have no doubt that these, though totally different in marking, are correctly to be referred as sexes to the same species, coming as they do from the same locality; the differences are exactly analogous to those occurring between the sexes of the nearly related *I. pieroides* and *I. insperata*. The reason of this remarkable dissimilarity I am as yet unable to conjecture.

109. *Iodis veraria*, Gn.

Thalassodes veraria, Gn., ix., 360.

Port Moresby (*Kowald*); two specimens.

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110. *Iodis byrsopis*, Meyr.

One specimen (*Sayer*).

Nemoria, *Hb.*

Face smooth. Antennæ in ♂ more or less dentate, moderately ciliated. Palpi moderate, porrected, with tolerably appressed scales, terminal joint short or long. Posterior tibiæ in ♂ dilated, without middle-spurs, in ♀ with all spurs present, posterior tarsi in ♂ much abbreviated. Fore wings with veins 3 and 4 stalked or separate, 6 out of 9, 10 out of 9, 11 free. Hind wings with veins 3 and 4 stalked, 6 and 7 stalked.

111. *Nemoria iosoma*, n. s.

♂ ♀, 23—25 mm. Face dark brown, fillet white, crown dull green. Palpi dark reddish, beneath whitish, terminal joint in ♂ short, in ♀ long. Antennæ whitish-fuscous, becoming whitish towards base, in ♂ slightly and flatly dentate, ciliations 2. Thorax dull green. Abdomen whitish-ochreous, in ♂ greenish-tinged towards base, in ♀ with basal fourth dull green, apical fourth greenish-tinged, remainder mixed with deep reddish above. Legs whitish, anterior pair suffused with pale reddish-ochreous, posterior tarsi in ♂ one-half. Fore wings with costa posteriorly moderately arched, hind margin rather obliquely rounded; dull olive-green; costal edge slenderly pale ochreous-yellowish, in ♀ with a few short dark fuscous strigulæ; lines slender, whitish, irregularly waved; first from before one-third of costa to two-fifths of inner margin, abruptly curved outwards beneath costa; second from three-fourths of costa to four-fifths of inner margin, somewhat sinuate inwards above middle and on lower third; a hind-marginal series of whitish dots; cilia grey. Hind wings with hind margin waved, obtusely angulated in middle, forming a short triangular projection; colour, hind-marginal dots, and cilia as in fore wings; a slender whitish line from three-fourths of costa to three-fourths of inner margin, bent in middle so as to form a moderate rounded angulation, and sinuate inwards above and below this. Hind wings beneath with a small cloudy blackish-grey apical spot.

Port Moresby (*Kowald*); two specimens.

Agathia, *Gn.*

112. *Agathia prasina*[illegible] n. s.

♂, 45 mm. Head fuscous-purple [illegible] lower part of face white, crown brig[illegible]

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irrorated with purple, terminal joint short. Antennæ ochreous-whitish, towards base irrorated with purple. Thorax fuscous-purple, a broad anterior band and moderately large posterior spot bright green. Abdomen purple irrorated with dark fuscous, apex and sides posteriorly whitish. Legs ochreous-whitish, anterior tibiæ tinged with purplish, posterior tarsi two-thirds. Fore wings with costa posteriorly moderately arched, hind margin rather oblique, slightly rounded and waved on upper half, lower half straight; bright yellowish-green; markings purple, partially tinged with whitish or brownish, and irregularly irrorated with dark fuscous; a moderate basal fascia, its outer edge curved beneath costa, and margined with blackish; a moderate more whitish-tinged streak along costa from base to apex, lower edge with a very slight projection before middle; a sharply defined hind-marginal band, on costa covering one-third of wing, gradually narrowed to one-sixth at anal angle, anterior edge mixed with reddish-brown and blackish, immediately within which is a faint paler waved line; a large oval green spot within hind-marginal band, rather irregular-edged, extending from near costa to near middle, not nearly touching either margin; cilia light purplish, base suffused with whitish from above middle to above anal angle. Hind wings with hind margin rounded, waved, with a large acute triangular projection below middle; colour and hind-marginal band as in fore wings, but inner edge of band proceeding from costa before apex towards anal angle, at three-fourths rectangularly bent inwards and continued along inner margin as an attenuated and very slender streak to base, where it is slightly dilated, above angulation somewhat waved; included green spot marginal, extending along hind margin from beneath apex to above middle; triangular projection of hind margin dark red irrorated with blackish; cilia purple, base whitish.

Port Moresby (*Kowald*); one specimen.

Pseudoterpna, *Hb.*

I find that the characters of this genus are identical with those of *Hypochroma*, Gn., as given elsewhere by myself; and I therefore propose to adopt this as the older name.

113. *Pseudoterpna diphtherina*, n. s.

♀, 30—34 mm. Head whitish-ochreous, reticulated with deep crimson-red. Palpi whitish-ochreous, irregularly blotched with deep red towards apex of joints, terminal joint moderately long.

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Antennæ whitish-ochreous, base reddish. Thorax and abdomen whitish-ochreous, faintly brownish-tinged. Legs whitish-ochreous, irregularly spotted and barred with deep crimson-red. Fore wings with costa straight, only arched immediately before apex, hind margin strongly bowed, oblique, irregularly crenulate; 11 anastomosing with 12 and then with 10; whitish-ochreous, slightly brownish-tinged, thinly strewn with fine transverse blackish strigulæ, and a few ferruginous scales; costal edge narrowly pale ferruginous, marked on anterior half with some black and deep red strigulæ; a small dark spot on costa before one-third, indicating first line; a narrow transverse ferruginous discal mark in middle; a series of cloudy dark ferruginous-reddish dots from an inwardly oblique blackish mark on costa at three-fourths to inner margin at two-thirds, slightly outwards-curved, less distinct and rather sinuate inwards on lower half; a cloudy ferruginous-reddish shade near beyond and parallel to this series on lower fourth; cilia ferruginous-red, tips white, dotted with blackish opposite veins. Hind wings with apex angularly prominent, hind margin slightly rounded, waved, with a short angular projection in middle; colour, strigulæ, and cilia as in fore wings, but apical dots of cilia red; posterior series of dots as in fore wings, but more indistinct.

Port Moresby (*Kowald, Sayer*); three specimens.

BOARMIADÆ.

TIGRIDOPTERA, *H.-S.*

114. *Tigridoptera cyanoxantha*, n. s.

♀, 52 mm. Head, palpi, and antennæ dark grey. Thorax ochreous-yellow, anterior margin dark grey. Abdomen ochreous-yellow. Legs grey, posterior tibiæ pale yellowish. Fore wings with costa gently arched, hind margin obliquely rounded; subbasal circular excavation beneath strongly marked; deep ochreous-yellow; a thick blackish-grey streak along costa from base, uniting with a very broad rather dark bluish-grey hind-marginal band, on costa extending to near middle, gradually narrowed to one-sixth at anal angle, anterior edge somewhat emarginate above inner margin, suffusedly irrorated with blackish on margins, especially towards anterior margin near costa, and on a subterminal series of very ill-defined cloudy spots; cilia bluish-grey, with pale dots on veins. Hind wings with hind margin rounded; deep ochreous-yellow; a moderate bluish-grey hind-marginal band, covering about one-fourth of wing, nearly evenly broad throughout, suffusedly irrorated with blackish on margins, more broadly anteriorly; cilia bluish-grey, with whitish dots on veins.

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Port Moresby (*Kowald*); one specimen. This species might be superficially mistaken for a *Celerena*.

Boarmia, *Tr.*

115. *Boarmia callicrossa*, n. s.

♂, 38 mm. Head, palpi, and antennæ whitish. Thorax whitish, irregularly mixed with ochreous and dark fuscous. Abdomen whitish, posteriorly ochreous-tinged, irregularly irrorated with black, especially on basal third. Legs pale whitish-ochreous, anterior pair with median bar of tibiæ and base of tarsal joints dark fuscous. Fore wings with costa posteriorly moderately arched, hind margin waved, rounded, rather strongly oblique; 10 and 11 free; whitish; costa fuscous-tinged, and marked with very fine blackish strigulæ; base pale fuscous; first line slender, black, irregular, from one-fourth of costa to one-fourth of inner margin, somewhat curved, preceded by a moderate pale ferruginous anteriorly fuscous-edged band; median space closely irrorated with blackish and some ochreous scales, except on a clear whitish patch preceding second line above middle; discal spot obscurely indicated, connected with costa by a cloudy darker mark; second line slender, black, irregularly waved, from two-thirds of costa to three-fifths of inner margin, gently curved, somewhat bent above middle, closely followed by a pale ferruginous band; subterminal whitish, regularly dentate, anteriorly margined by a thick cloudy blackish-grey suffusion, mixed with blue-whitish on its anterior edge, and posteriorly by a narrower blackish suffusion becoming obsolete towards costa; a hind-marginal series of blackish dots; cilia pale brownish, obscurely barred with whitish, terminal half whitish. Hind wings with hind margin rounded, crenulate; whitish; basal third closely irrorated with blackish, median space almost clear; second line, all posterior markings, and cilia as in fore wings.

♀, 42 mm. Entire insect irregularly suffused with light fuscous and irrorated with dark fuscous, all pale areas obscured; first and second lines thicker; pale ferruginous bands much obscured with fuscous irroration; dark margins of subterminal line lighter and much less marked; a distinct irregular discal spot indicated in both wings with whitish scales, surrounded by an ill-defined blackish-grey suffusion.

Port Moresby (*Kowald, Sayer*); two specimens. I have no doubt that these are truly sexes of the same species, though dissimilar at first sight.

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116. *Boarmia epistictis*, n. s.

♂ ♀, 48—50 mm. Head ochreous-whitish. Palpi ochreous-whitish, irrorated with dark fuscous. Antennæ irregularly marbled with whitish-ochreous and dark fuscous. Thorax ochreous-whitish, more or less mixed with ochreous and dark fuscous. Abdomen whitish-ochreous or whitish, irrorated with dark fuscous, in ♂ with base covered above by a flat spreading tuft of white scales from posterior edge of thorax, and with lateral margins slightly tufted above middle. Legs whitish-ochreous irrorated with fuscous, anterior and middle tibiæ and tarsi dark fuscous ringed with whitish-ochreous. Fore wings with costa posteriorly moderately arched, hind margin rounded, rather strongly oblique; 10 and 11 free; pale brownish-ochreous, irrorated with dark fuscous, in ♂ more or less suffused with white beyond first line and on a broad cloudy streak running from disc at two-thirds to apex, in ♀ more or less wholly suffused with white; first and second lines black, well-marked, irregularly subdentate, in ♀ tending to be interrupted; first from one-third of costa to one-fourth of inner margin, somewhat curved, slightly prominent in middle, dilated on costa; second from two-thirds of costa to three-fifths of inner margin, upper half slightly sinuate outwards, dilated on costa; discal spot represented by a cloudy blackish suffusion, in ♀ mixed with white scales, more or less connected with a small cloudy blackish spot on middle of costa; faint indications of a darker median shade passing through this midway between first and second lines; subterminal white, tolerably defined, regularly dentate, anteriorly margined by a cloudy blackish suffused spot above middle; in ♀ a darker brownish suffusion beyond subterminal from beneath apex to above middle of hind margin, in ♂ less marked; a hind-marginal series of black dots, sometimes connected with short blackish streaks between veins; cilia white, more or less suffusedly and indistinctly barred with pale brownish. Hind wings with hind margin rounded, crenulate; colour and markings as in fore wings, but first line obsolete, median shade well-marked, more or less thick, blackish, nearly straight; discal spot more distinctly white, black-margined; second line curved outwards on upper two-thirds, often more strongly marked; subterminal without the dark marginal suffusions above middle, but sometimes margined anteriorly with a blackish suffusion towards lower extremity.

Seven specimens (*Sayer*).

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Phelotis, n. g.

Face with appressed scales. Tongue developed. Antennæ in ♂ bipectinated, towards apex filiform. Palpi moderate, porrected, more or less rough-scaled, terminal joint short or moderate. Thorax hairy beneath. Posterior tibiæ in ♂ more or less dilated. Fore wings in ♂ with subbasal impression; 10 and 11 stalked or coincident, 10 sometimes connected with 9. Hind wings normal.

To this genus are referable *excursaria*, Gn., *luxaria*, Gn., *cognata*, Walk., *attenta*, Walk., *pallidiscaria*, Walk., and a number of undescribed Australian species.

117. *Phelotis xylinopa*, n. s.

♀, 45 mm. Head, palpi, antennæ, thorax, abdomen, and legs whitish-ochreous, irrorated with reddish-fuscous. Fore wings with costa almost straight, faintly sinuate, hind margin rounded, oblique, crenulate; pale reddish-fuscous, costa and veins suffused with whitish-ochreous, and irrorated with dark ochreous-fuscous; an indistinct irregular angulated fuscous line from a small dark spot on costa at one-fifth to one-fifth of inner margin; first and second lines slender, blackish, starting from small spots on costa, hardly perceptibly waved; first from one-third of costa to one-fourth of inner margin, somewhat curved; second from two-thirds of costa to three-fifths of inner margin, slightly curved, sinuate inwards on submedian fold; a dark fuscous median line from a small spot on middle of costa to before middle of inner margin, upper two-thirds strongly curved outwards and indistinct, lower third well-marked, somewhat sinuate; an indistinct whitish three-lobed discal spot before this, surrounded by a suffusion hardly darker than ground colour; a suffused pale whitish-ochreous spot between median and second lines above middle; subterminal cloudy, whitish, dentate, sinuate inwards below middle, above which it is preceded by a cloudy fuscous spot; traces of an indistinct cloudy fuscous shade between second and subterminal lines; a hind-marginal series of black dots; cilia whitish-ochreous mixed with pale reddish-fuscous. Hind wings with hind margin rounded, crenate; colour, second line, and all posterior markings as in fore wings, but basal half paler and more whitish-tinged; median line blackish, rather thick, somewhat irregular, nearly straight, at about two-fifths; discal spot obscure, whitish, sub-crescentic, surrounded by a light reddish-fuscous suffusion, beyond median line; an indistinct cloudy whitish-ochreous line midway

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between second and subterminal lines, becoming obsolete towards costa.

Port Moresby (*Kowald*); one specimen.

Tephrina, *Gn.*

Face smooth, with ridge of projecting scales at lower margin; tongue developed. Antennæ in ♂ strongly bipectinated, apex simple. Palpi moderately long, porrected, clothed with dense rough projecting scales, terminal joint moderate. Thorax slightly hairy beneath. Posterior tibiæ in ♂ not dilated. Fore wings in ♂ with small subbasal impression; 10 and 11 stalked, 12 sometimes connected by bar with 11. Hind wings normal.

118. *Tephrina homalodes*, n. s.

♂ ♀, 23—24 mm. Head and palpi in ♂ light yellowish-ochreous, in ♀ ochreous-whitish. Antennæ whitish, pectinations (*a* 5, *b* 7) longitudinally streaked with blackish. Thorax pale brownish-ochreous, posteriorly whitish. Abdomen whitish, sprinkled with pale fuscous. Legs whitish irrorated with fuscous. Fore wings with costa slightly arched, hind margin gently rounded, rather oblique; in ♂ pale brownish-ochreous, in ♀ pale whitish-ochreous, irrorated with light fuscous; costa in ♂ more yellowish-ochreous; a fuscous discal dot; a fuscous hind-marginal line, in ♀ only partially indicated; cilia in ♂ whitish-fuscous, with two faint darker lines, beneath anal angle whitish, in ♀ wholly whitish. Hind wings with hind margin rounded; colour, hind-marginal line, and cilia as in fore wings, but base of wings more whitish, especially in ♀.

Port Moresby (*Kowald*); three specimens.

Strenia, *Dup.*

119. *Strenia deerraria*, Walk.

Tephrina deerraria, Walk., 962; *T. normata*, ib., 966; *Aspilates exfusaria*, ib., 1683.

One specimen (*Sayer*).

Macaria, *Curt.*

120. *Macaria isospila*, n. s.

♀, 27 mm. Head, palpi, antennæ, and thorax fuscous-whitish, partially sprinkled with dark fuscous. (Abdomen broken). Legs whitish-ochreous, irrorated with dark fuscous. Fore wings with

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costa slightly sinuate in middle, posteriorly moderately arched, hind margin waved, slightly rounded, oblique, rather deeply sinuate on upper half; 10 free, 11 absent; whitish-ochreous, closely irrorated with fuscous strigulæ, and suffusedly mixed with whitish; lines slender, well-marked, dark fuscous; first from before one-third of costa to one-fourth of inner margin, sharply angulated beneath costa; second from two-thirds of costa to three-fifths of inner margin, posteriorly finely and obscurely margined with ochreous-whitish, sharply angulated below costa, but interrupted immediately below angulation; a dark fuscous discal dot; a small ill-defined rather dark fuscous spot on middle of costa, whence proceed faint traces of a darker median shade; two small irregular dark fuscous spots between angulation of second line and costa at five-sixths; second line marked in middle by a bilobed blackish, fuscous spot, which it bisects; a cloudy whitish longitudinal spot beneath apex; an interrupted irregular blackish-fuscous hind-marginal line; cilia fuscous-whitish, obscurely barred with fuscous and dark fuscous. Hind wings with hind margin waved, sharply angulated in middle, where it forms a triangular projection; colour, hind-marginal line, and cilia as in fore wings; a slightly curved dark fuscous median line, preceded by an obscure pale line, and slightly dilated in middle, nearly followed by a dark fuscous discal dot; second line slightly waved, dark fuscous, followed by a pale line, angulated in middle, where it bisects a blackish bilobed spot as in fore wings, but rather larger.

One specimen (*Sayer*).

Lagyra, *Walk.*

Face with appressed scales; tongue developed. Antennæ in ♂ strongly bipectinated, apex simple. Palpi moderate, porrected, shortly rough-scaled, terminal joint very short. Thorax and femora hairy beneath. Posterior tibiæ in ♂ not dilated. Fore wings in ♂ with subbasal impression; 10 and 11 stalked. Hind wings normal.

121. *Lagyra talaca*, Walk.

Lagyra talaca, Walk., 59; Moore, Lep. Ceyl., iii., 392, pl. 185, 1; *Chizala deceptatura*, Walk., 264; *Lagyra bombycaria*, Walk., Suppl., 1539.

♂, 40 mm. Head, palpi, antennæ, thorax, abdomen, and legs rather dark fuscous, slightly sprinkled with whitish; antennal pectinations *a* 9, *b* 11. Fore wings with costa strongly arched on posterior half, apex produced, round-pointed, hind margin oblique-

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rather dark fuscous, irregularly irrorated with ochreous-grey-whitish; markings darker fuscous, slightly ochreous-tinged, ill-defined; a cloudy line from one-third of costa to two-fifths of inner margin, obtusely angulated near costa; a broader cloudy median shade from middle of costa to three-fifths of inner margin, nearly straight, slightly sinuate inwards on lower half; an indistinct subcrescentic dark fuscous discal mark close beyond this; a cloudy line from two-thirds of costa to three-fourths of inner margin, rather irregular, curved outwards, sinuate inwards on lower third; a cloudy subterminal shade, parallel to hind margin on lower three-fourths, but obsolete towards costa and widely interrupted below middle; cilia fuscous. Hind wings with hind margin obtusely angulated in middle, where it forms a short triangular projection; colour and cilia as in fore wings; a cloudy darker ochreous-fuscous angulated line at one-third; faint indications of two darker posterior lines, but hardly traceable.

One specimen (*Sayer*). *Hyposidra vampyraria*, Snell., which I have not seen, is obviously nearly allied to this, and presumably referable to the same genus.

BURSADA, *Walk.*

122. *Bursada placens*, Pag.

Bursada placens, Pag., Jahrb. Nass. Ver., 1886, 60.

Port Moresby (*Kowald*, *Sayer*); two specimens. It approaches *B. basistriga*, Walk., from Mysol, but is quite distinct.

PLUTODES, *Gn.*

123. *Plutodes discigera*, Butl.

Plutodes discigera, Butl., Ann. Mag., 1880, 223; Ill. Het., vi., 80, pl. cxix., 2; *P. flavescens*, ibid., 3.

Port Moresby (*Kowald*); one specimen. It is very probable that this is only a form of *P. cyclaria*, Gn.

SICULODIDÆ.

STRIGLINA, *Gn.*

124. *Striglina myrtæa*, Drury.

One specimen (*Sayer*).

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SICULODES, *H.-S.*

125. *Siculodes scitaria*, Walk.

Drepanodes scitaria, Walk., Geom., 1488; *Anisodes pyriniata*, Walk., Geom., 1582; *Thermesia reticulata*, ib., Suppl., 1062; *Azazia navigatorum*, Feld., Reis. Nov., pl. cxvii., 4; *Homodes thermesioides*, Snell., T. v. E., 1877, 28, pl. ii., 15; *Sonagara scitaria*, Moore, Lep. Ceyl. iii., 206, pl. 175, 1.

♀, 22—25 mm. Head, palpi, antennæ, thorax, abdomen, and legs reddish-ochreous; base of abdomen and a transverse median line purplish; anterior legs purplish irrorated with dark fuscous, apex of joints whitish. Fore wings triangular, costa hardly arched, apex rectangular, hind margin rounded, slightly oblique; 8 and 9 rather widely remote; rather deep reddish-ochreous, with darker or purplish reticulations, sometimes indistinct; four or five dark grey dots on costa; a straight narrow purple line from three-fifths of inner margin towards apex, but becoming obsolete before reaching it; cilia reddish-ochreous, terminal half barred with dark purplish-grey. Hind wings with colour and reticulations as in fore wings; a straight purple line from before middle of costa to before middle of inner margin; cilia reddish-ochreous, with a slender purplish median line.

Port Moresby (*Kowald*, *Sayer*); three specimens. Also from Japan, India, Ceylon, Celebes, Tonga.

126. *Siculodes aurata*, Butl.

One specimen (*Sayer*).

PYRALIDIDÆ.

BALANOTIS, *Meyr.*

127. *Balanotis crypsaula*, Meyr.

One specimen (*Sayer*).

128. *Balanotis didymalis*, Walk.

One specimen (*Sayer*).

TERMIOPTYCHA, n. g.

Forehead rounded; ocelli present; tongue developed. Antennæ three-fourths, in ♂ ciliated with fascicles (2). Labial palpi very

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long, recurved, second joint fringed with long rough projecting scales on inner side, terminal joint about half second, acute, with a triangular posterior tuft of projecting scales rising from apex of second joint, and terminal joint except apex. Maxillary palpi very short, filiform. Thorax with a slight posterior crest, in ♂ beneath with a pencil of hairs from behind anterior coxæ. Posterior tibiæ rough-scaled. Fore wings in ♂ with hind margin broadly folded over beneath; vein 1 simple, 7 and 8 out of 9, 10 shortly appressed to 9 above 7. Hind wings 1¼, in ♂ beneath with a patch of short dense hairs extending along costa; veins 4 and 5 stalked, 7 out of 6 near origin, 8 free, approximated shortly to 7 before its middle.

A singular genus; the hind-marginal fold is, so far as I know, a quite unique character.

129. *Termioptycha cyanopa*, n. s.

♂, 24 mm. Head whitish, between antennæ whitish-ochreous spotted with dark fuscous; eyes green-blue. Palpi white, mixed with pale ochreous, and with four irregular undefined dark fuscous bands. Antennæ whitish-ochreous. Thorax pearly white, irregularly mixed with ochreous and prismatic grey, anterior margin rather broadly prismatic grey. Abdomen white, mixed with reddish-ochreous and dark fuscous, anal segment light reddish-ochreous above. Legs light reddish-ochreous, more or less suffusedly irrorated with blackish, apex of joints whitish. Fore wings rather elongate-triangular, costa straight, hind margin rounded but appearing subtruncate from being folded over; ashy-grey; costal half of basal area, and whole space between first and second lines ochreous-brown, partially tinged with reddish or greenish; a moderate quadrate snow-white spot on base of costa, followed by some scattered black scales; first and second lines irregular, yellow-whitish, becoming white on costa; first from two-fifths of costa to before middle of inner margin, dilated above middle, somewhat bent below middle; second from four-fifths of costa to two-thirds of inner margin, thrice sinuate inwards, interrupted in middle; space between first and second lines coarsely mixed with black except towards costa. Hind wings pale ochreous-reddish, becoming deeper fuscous-reddish towards hind margin; cilia composed of flat scales, whitish-ochreous, on upper half mixed with fuscous-reddish and dark fuscous towards base.

One specimen (*Sayer*).

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STEMMATOPHORA, *Gn.*

130. *Stemmatophora vibicalis*, Ld.

Port Moresby (*Kowald*); two specimens.

ENDOTRICHA, *Gn.*

131. *Endotricha externalis*, Walk.

Port Moresby (*Kowald*); one specimen.

132. *Endotricha persicopa*, n. s.

♀, 17 mm. Head, palpi, and thorax crimson-purple. Antennæ pale grey. Abdomen bright yellow, basal two-fifths crimson-purple. (Legs broken.) Fore wings elongate-triangular, costa faintly sinuate, posteriorly slightly arched, apex obtuse, hind margin bowed, very oblique; 4 and 5 moderately stalked; crimson-purple, irrorated with dark grey; a moderate deep yellow fascia from before middle of costa to middle of inner margin, dilated towards each extremity, anteriorly slenderly blackish-edged; costal edge spotted with blackish from before middle to three-fourths; a moderate ill-defined deep yellow spot on costa before apex; cilia crimson-purple, at apex and anal angle yellow. Hind wings bright yellow; basal third crimson-purple irrorated with dark grey, its outer edge bounded by a slender curved blackish line; a moderate rounded crimson-purple apical blotch, irrorated with dark grey; cilia yellow, round apical blotch crimson-purple.

One specimen (*Sayer*).

CIRRHOCHRISTA, *Ld.*

Forehead flat, oblique; ocelli absent; tongue developed. Antennæ two-thirds, in ♂ stout, ciliated (Ld.). Labial palpi long, straight, porrected, rough-scaled, attenuated to apex. Maxillary palpi moderate, triangularly dilated with rough scales. Posterior tibiæ with outer spurs one-fourth of inner. Fore wings with vein 1 simple, 4 and 5 closely approximated at base, 6 sometimes from point with 9, 7 and 8 out of 9, 10 approximated to 9. Hind wings 1; veins 4 and 5 closely approximated at base, 7 out of 6, anastomosing with 8 to middle.

Lederer omitted to notice the stalking of vein 7 of the fore wings with 9, and has consequently placed this genus away from its true allies.

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133. *Cirrhochrista brizonalis*, Walk.

Margaronia brizonalis (*-oalis*), Walk., 976; *Cirrhochrista ætherialis*, Ld., 441, pl. xvii., 9.

A variable insect; sometimes a transverse line proceeding from first costal spot, sometimes reduced to a dot on inner margin; sometimes a large slender ring beneath second costal spot, resting on anal spot, sometimes reduced to two or three dots. Lederer's brief specific description appears quite unrecognisable, but his figure is certainly this species.

Port Moresby (*Kowald*); two specimens. Also from China, Amboina, and North Australia.

Syndicastis, n. g.

Forehead rounded; ocelli present; tongue developed. Antennæ three-fourths, in ♂ ciliated with fascicles (2). Labial palpi moderately long, porrected, second joint with short projecting scales, terminal joint moderate. Maxillary palpi moderate, dilated with scales towards apex. Posterior tibiæ with outer middle-spur one-third, outer end-spur one-half of inner. Fore wings with vein 1 simple, 4 and 5 very closely approximated towards base, 7 and 8 out of 9, 10 closely approximated to 9. Hind wings 1; veins 4 and 5 stalked, 7 out of 6 near origin, anastomosing with 8 to middle.

134. *Syndicastis heteromima*, n. s.

♂, 15 mm. Head and thorax light yellowish-ochreous, somewhat mixed with fuscous. Palpi dark fuscous, beneath white towards base. Antennæ whitish-ochreous. Abdomen light yellow-ochreous, sprinkled with fuscous, segmental margins white. Legs ochreous-whitish, anterior pair banded with dark fuscous. Fore wings rather elongate-triangular, costa posteriorly gently arched, apex obtuse, hind margin somewhat bowed, rather strongly oblique; light yellow-ochreous; costal edge white, irregularly marked with dark fuscous, tending to form half-rings, towards base and apex wholly dark fuscous; a fuscous suffusion extending over whole wing from base to second line, except towards inner margin; first line straight, dark fuscous, terminating on inner margin at two-fifths, only traceable on lower half; five snow-white spots, suffusedly margined with dark fuscous; first moderate, roundish, beneath costa at one-third; second similar, beneath middle of wing, posterior edge indented; third larger, transverse,

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beneath costa at two-thirds; fourth and fifth very small, transversely placed, adjacent, upper touching lower posterior angle of third; second line formed by posterior margins of four latter spots; a fuscous submarginal fascia, its margins waved; a hind-marginal series of fuscous dots; cilia whitish-ochreous, on costa dark fuscous. Hind wings light yellow-ochreous, thinly scaled; a fuscous discal dot at one-third; second line slender, fuscous, about middle, central third forming a quadrate projection outwards; a slender indistinct fuscous submarginal fascia; cilia whitish-ochreous, at anal angle whitish.

Port Moresby (*Kowald*); one specimen.

BOTYDIDÆ.

MARGARODES, *Gn.*

135. *Margarodes celsalis*, Walk.

Botys celsalis, Walk., 654; *B. ardealis*, Feld., Reis. Nov., pl. cxxxiv., 31; *Margaronia inusitata*, Butl., Ann. Mag., 1879, 454; *M. celsalis*, Moore, Lep. Ceyl., iii., 325, pl. 181, 4.

Port Moresby (*Kowald*); one specimen. Also from Ceylon, Borneo, and Japan. Felder's figure is bad.

136. *Margarodes suralis*, Ld.

Chloauges suralis, Ld., 405, pl. xiv., 7; *Margaronia Woodfordii*, Butl., Ann. Mag., 1885, 241.

One specimen (*Sayer*). Also from Amboina and the Solomon Islands. The genus *Chloauges*, founded by Lederer for the reception of this species, appears to have in reality no sufficient characters; the alleged absence of ocelli is based on an unaccountable error, as they are well-marked and conspicuous; the sinuation of the hind margin is a very trivial and worthless point; and the only other distinction is the scaly dilation of the anterior tibiæ, on which it seems undesirable to insist, the species being in all other respects very closely allied to the other green species of *Margarodes*; I have therefore suppressed the genus.

PACHYARCHES, *Ld.*

137. *Pachyarches psittacalis*, Hb.

Three specimens (*Sayer*).

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Ancyloptila, n. g.

Forehead flat, oblique; ocelli present; tongue developed. Antennæ four-fifths, in ♂ minutely ciliated (¼), with a sinuation at about one-fifth, base of stalk swollen, and with a tooth of scales on inner side. Labial palpi moderate, subascending, second joint densely clothed with rough scales, more projecting towards apex, terminal joint very short, concealed. Maxillary palpi moderate, dilated with loose scales towards apex. Abdomen in ♂ with large exsertible anal tuft. Posterior tibiæ in ♂ short, bent, rough-scaled, with a dense recurved tuft of long hairs from near base above and another from near apex, meeting above middle, outer spurs half inner. Fore wings with veins 8 and 9 stalked, 10 closely approximated throughout, 11 very oblique. Hind wings over 1; veins 3, 4, 5 closely approximated at base, 7 out of 6 near origin, anastomosing with 8 to one-third.

138. *Ancyloptila lactoides*, Pag.

Margarodes lactoides, Pag., Jahrb. Nass. Ver. 1886, 69.

One specimen (*Sayer*). I believe this identification is probably correct; but since the original description is taken from a ♀, it is not absolutely certain.

Phacellura, *Guild.*

139. *Phacellura indica*, Saund.

One specimen (*Sayer*).

Glyphodes, *Gn.*

140. *Glyphodes megalopa*, n. s.

♂ ♀, 24—27 mm. Head whitish, behind eyes dark fuscous. Palpi fuscous, beneath white towards base. Antennæ whitish-ochreous. Thorax whitish, with a fuscous longitudinal stripe on each side of back, patagia ochreous-tinged, with a central dark fuscous stripe. Abdomen white, segmental margins pale grey, anal tuft of ♂ blackish. Legs pale greyish-ochreous, posterior pair whitish. Fore wings very elongate-triangular, costa posteriorly moderately arched, apex obtuse, hind margin obliquely rounded; whitish, with purple reflections; markings pale ochreous-yellowish, strongly margined with rather dark fuscous; a narrow streak along costa from base to apex; a moderate oblique subbasal fascia, its outer edge acutely indented in middle; a straight narrow fascia

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from one-fourth of costa to before middle of inner margin, its outer edge emitting a strong obtuse projection below middle; a dark fuscous dot beneath costal streak at one-third; a moderate suboval deep black spot above middle, centred with a white dot, and surrounded first with a rather thick light ochreous-yellowish ring, and then with a dark fuscous margin touching costa above; sometimes a yellowish dot, margined with dark fuscous, touching lower margin of this ocellus; a slender fascia from three-fourths of costa to three-fourths of inner margin, sinuate inwards on upper half and outwards on lower half; a rather broad hind-marginal fascia, narrowed towards both extremities, anterior margin with a short triangular tooth beneath costa; cilia grey, above anal angle whitish. Hind wings whitish, with purple reflections; an irregular fuscous transverse streak from costa at two-fifths, reaching half across wing; a dark fuscous transverse line at two-thirds, not quite reaching inner margin, sinuate inwards beneath costa, and curved outwards below middle; a moderate dark fuscous apical spot, whence proceeds a slender pale yellowish anteriorly fuscous-margined streak along hind margin to anal angle; cilia white, round apex with a cloudy grey line and yellowish-tinged.

Port Moresby (*Kowald*); two specimens. The curious central ocellus makes this a very distinct species.

141. *Glyphodes ityalis*, Walk.

One specimen (*Sayer*).

142. *Glyphodes zelimalis*, Walk.

Glyphodes zelimalis, Walk., 502, 974.

♀, 25 mm. Head whitish-ochreous, darker between antennæ, orbits white. Palpi light ochreous, towards base white beneath. Antennæ whitish-ochreous. Thorax whitish, with four longitudinal deep ochreous stripes. Abdomen whitish, with an obscure deep ochreous stripe on each side of back on basal half. Legs whitish, anterior pair pale ochreous-yellowish. Fore wings very elongate-triangular, costa posteriorly moderately arched, apex obtuse, hind margin obliquely rounded; whitish, thinly scaled, with strong prismatic reflections; markings ferruginous-ochreous; base greyish-tinged; a slender streak from base of costa to two-fifths of inner margin, and another from costa near base to inner margin beyond first; a straight slender fascia from beyond one-fourth of costa to middle of inner margin, closely preceded by a fine parallel line; a moderate straight fascia from middle of costa to two-thirds of

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inner margin, gradually narrowed almost to a point at lower extremity, obscurely edged with dark fuscous, anterior margin parallel to preceding fascia, containing a pale prismatic-blue central transverse line not reaching inner margin; two parallel almost straight lines, separated by a whitish line, from three-fourths of costa to two-thirds of inner margin, where the anterior is confluent with preceding fascia, anterior thickened on upper half, posterior suffused with dark fuscous; space beyond this somewhat ochreous-tinged, with strong purple reflections; a dusky ferruginous-ochreous inwards-curved streak from apex to inner margin before anal angle, and a slender streak along hind margin; cilia whitish. Hind wings whitish, with prismatic reflections; hairs towards inner margin ochreous-tinged; a short very oblique ferruginous-ochreous mark in middle of disc; a ferruginous-ochreous line from beneath costa at two-thirds towards anal angle, near which it appears to be dentate, but is almost obsolete, closely followed by a parallel dark fuscous line separated from it by a whitish line; a moderate ferruginous-ochreous cloudy fascia from beneath costa before apex to hind margin above anal angle, centrally suffused with dark fuscous, space before and beyond it ochreous-tinged; a ferruginous-ochreous hind-marginal line; cilia whitish, on lower half of hind margin with a dark fuscous median line and tips fuscous.

Port Moresby (*Kowald*); one specimen. Also from Borneo.

143. *Glyphodes scapulalis*, Ld.

Heterocnephes scapulalis, Ld., 402, pl. xiv., 5.

Lederer's genus *Heterocnephes*, founded on this species, is only separated from *Glyphodes* by an insignificant difference in the anal tuft, which appears to me insufficient: the species is in all respects closely related to the ordinary forms of *Glyphodes*, with which I unite it.

One specimen (*Sayer*).

144. *Glyphodes bicolor*, Swains.

Two specimens (*Sayer*). I substitute this name for *perspicillalis*, Z., having hitherto doubted its identity.

145. *Glyphodes luciferalis*, Walk.

Botys luciferalis, Walk., Suppl., 1412.

♀, 32 mm. Head whitish-ochreous, face snow-white, space between antennæ dark ferruginous. Palpi whitish-ochreous,

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irregularly barred with dark ferruginous, base white beneath. Antennæ light ochreous. Thorax pale yellowish-ochreous, reticulated with deep ferruginous, patagia snow-white except base. Abdomen yellow-ochreous, densely irrorated and spotted with deep ferruginous, basal half spotted with snow-white. Legs white, anterior pair and middle tibiæ ochreous-yellow, base of spurs dotted with dark fuscous. Fore wings elongate-triangular, costa posteriorly moderately arched, apex obtuse, hind margin bowed, oblique; whitish-ochreous, yellowish-tinged in disc; costa yellow-ochreous, irrorated with deep ferruginous; two irregular deep ferruginous transverse lines near base, between which is a small white spot beneath costa; a straight moderate snow-white fascia from beneath costa at one-fourth to one-third of inner margin, margined with deep ferruginous, anterior edge deeply irregularly excavated towards middle; a large subtriangular purple-whitish spot, margined with deep ferruginous, beneath costa at two-fifths, reaching more than half across wing, including a small spot of ground colour on its upper margin; a smaller triangular purple-whitish spot, margined with deep ferruginous, on middle of inner margin, ferruginous margin of its apex coalescing with that of preceding spot; a very small white ferruginous-margined round spot in middle of disc, and a larger similar spot close beneath it; a large transverse fascia-like purple-whitish blotch, margined with deep ferruginous, from beneath costa at three-fifths towards anal angle, but not nearly reaching it, posterior edge rather abruptly excavated in middle; a deep ferruginous blotch extending from lower extremity of this to and over lower third of hind margin; an irregular narrow white ferruginous-margined fascia from beneath costa at four-fifths to three-fourths of inner margin, curved parallel to hind margin, almost obsolete on dark supra-anal blotch, anterior margin sharply indented above middle, posterior margin slenderer, shortly dentate throughout; veins between this and hind margin marked with ferruginous; a slender ferruginous line midway between fascia and hind margin; a deep ferruginous hind-marginal line; cilia pale ochreous-yellowish, with a deep ferruginous line on central third of hind margin. Hind wings with colour, posterior fascia, and all posterior markings as in fore wings, but supra-anal blotch smaller; a rather broad median purple-whitish fascia, not reaching inner margin, where it terminates in a ferruginous suffusion, anterior margin nearly straight, preceded by a rather broad deep ferruginous suffusion, posterior margin angularly projecting outwards below middle, margined with deep ferruginous.

One specimen (*Sayer*). Also from India. This is

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specifically a very distinct species, and as I have not been able to examine a ♂, I cannot be sure that it is strictly referable to this genus

Lepyrodes, *Gn.*

I now propose to unite under this name the genera which I formerly concurred in holding distinct as *Lepyrodes*, Gn., *Phalangiodes*, Gn., *Rhimphalea*, Ld., and *Synclera*, Ld. These groups, consisting hitherto of only two or three species each, are only distinguished essentially by characters drawn from the hairiness of the anterior tibiæ or tarsi in the ♂, and I am now of opinion that it will be advantageous to neglect these, and unite them all together. The new species described below helps to obliterate the distinction, being specifically nearly allied to *Rhimphalea lindalis*, but without the hairy tibiæ characteristic of that species.

146. *Lepyrodes neptis*, Cr.

One specimen (*Sayer*).

147. *Lepyrodes circotoma*, n. s.

♂, 16 mm. Head ochreous-whitish, face dark fuscous, except a spot above each eye. Palpi dark fuscous mixed with whitish. Antennæ pale greyish-ochreous, ciliations 1. Thorax dark fuscous, spotted with ochreous-whitish. Abdomen ochreous-whitish, segmental margins dark fuscous. Legs dark fuscous, apex of joints whitish, posterior pair whitish, anterior tibiæ not hairy. Fore wings very elongate-triangular, costa posteriorly gently arched, apex obtuse, hind margin rounded, rather strongly oblique; dark fuscous, veins somewhat darker; costa narrowly ochreous-white, marked with three semicircular blackish half-rings between middle and second line; a whitish transverse line near base; first and second lines well-marked, ochreous-whitish, first from one-fourth of costa to one-third of inner margin, rather curved outwards, second from five-sixths of costa to two-thirds of inner margin, central third strongly curved outwards in a narrow subdentate loop so as to closely approach hind margin above anal angle; between these are about eight irregularly placed short whitish marks in disc; cilia dark fuscous mixed with whitish (imperfect). Hind wings whitish; base dark fuscous; a cloudy ring-shaped dark fuscous discal spot; second line from two-thirds of costa to

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inner margin above anal angle, whitish, anteriorly margined with dark fuscous, subdentate, central third curved outwards abruptly so as nearly to reach hind margin below middle; space beyond second line wholly dark fuscous; cilia whitish, somewhat mixed with dark fuscous, with a cloudy dark fuscous line. Fore wings beneath marked as above, but with an ochreous-yellow subcostal streak, and posterior area longitudinally striated with white.

Port Moresby (*Kowald*); one specimen. Very similar in markings to *L. lindalis*, but much smaller, darker, and more sharply marked, and readily distinguished by the costal half-rings.

Hymenoptychis, *Z.*

148. *Hymenoptychis sordida*, Z.

Botys pterophoralis, Walk., Suppl., 1413.

Port Moresby (*Kowald*); one specimen.

Cnaphalocrocis, *Ld.*

149. *Cnaphalocrocis medinalis*, Gn.

One specimen (*Sayer*).

Marasmia, *Ld.*

150. *Marasmia ruralis*, Walk.

One specimen (*Sayer*).

Ischnurges, *Ld.*

151. *Ischnurges illustralis*, Ld.

One specimen (*Sayer*).

Diplotyla, *Meyr.*

152. *Diplotyla chloronota*, n. s.

♂ ♀, 24—25 mm. Head in ♂ ochreous-whitish, centre of crown and a bar on forehead dark fuscous; in ♀ dark fuscous, above eyes mixed with whitish. Palpi dark fuscous, lower half obliquely ochreous-white. Antennæ fuscous, tufts of ♂ partly ochreous-whitish. Thorax in ♂ light ochreous-brown, in ♀ dark fuscous. Abdomen dark fuscous. Legs whitish-ochreous, anterior pair dark fuscous, except apex of joints. Fore wings elongate-triangular,

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costa sinuate in middle, posteriorly gently arched, apex obtuse, hind margin rounded, oblique; dark fuscous, with a slight purplish gloss; first line indistinct, somewhat paler, followed by a darker shade, from one-fourth of costa to one-third of inner margin; a quadrate somewhat darker spot in middle of disc, in ♀ preceded by a small roundish ochreous-white spot, and followed by a small transverse ochreous-white spot, these in ♂ indicated but almost obsolete; second line somewhat paler, in ♀ forming a small ochreous-white spot on costa, preceded throughout by a darker shade, running from three-fourths of costa towards anal angle, sinuate above middle, below middle rectangularly bent inwards to beneath second white discal spot, and again rectangularly bent to inner margin at two-thirds; cilia rather dark fuscous, with a darker line, in ♀ tips ochreous-white on a small spot above anal angle. Hind wings with colour, second line, and cilia as in fore wings, but second line in ♀ more ochreous-whitish on lower third, without costal spot; an indistinct darker discal spot, followed in ♀ by a very small ochreous-white spot touching angle of second line.

Two specimens (*Sayer*).

Endocrossis, n. g.

Forehead flat, oblique; ocelli present; tongue developed. Antennæ five-sixths, in ♂ shortly ciliated (⅔). Labial palpi moderate, arched, ascending, second joint with dense projecting scales beneath, terminal joint extremely short, thick, obtuse. Maxillary palpi moderate, somewhat dilated terminally with loose scales. Abdomen in ♂ with dense exsertible anal tuft. Middle femora hairy beneath towards base; posterior tibiæ in ♂ rather short, considerably dilated, outer spurs half inner. Fore wings with veins 8 and 9 stalked, 10 closely approximated, 11 very oblique. Hind wings 1, in ♂ beneath with a ridge above anal angle, whence proceeds a broad overhanging tuft of hairs towards anal angle; veins 3, 4, 5 approximated at base, 7 out of 6 near origin, anastomosing with 8 to one-third.

153. *Endocrossis flavibasalis*, Moore.

Botyodes flavibasalis, Moore, Proc. Zool. Soc. Lond., 1867, 96; Feld., pl. cxxxv., 41.

Port Moresby (*Kowald*); one specimen.

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Pagyda, *Walk.*

Forehead flat, oblique; ocelli present; tongue developed. Antennæ four-fifths, in ♂ serrate, minutely ciliated (¼). Labial palpi moderate, second joint arched, ascending, with long dense rough projecting scales in front, terminal joint moderately long, very slender, porrected. Maxillary palpi moderate, somewhat dilated terminally with loose scales. Abdomen in ♂ with small anal tuft, anal segment elongate. Middle tibiæ in ♂ rather dilated, posterior tibiæ with outer spurs half inner. Fore wings with veins 8 and 9 stalked, 10 closely approximated, 11 very oblique. Hind wings 1; veins 3, 4, 5 approximated at base, 7 out of 6 near origin, anastomosing with 8 to one-third.

To this genus is referable, besides the following species, *P. amphisalis*, Walk. (*quadrilineata*, Butl.).

154. *Pagyda salvalis*, Walk.

Pagyda salvalis, Walk., 487.

♀, 17 mm. Head orange, sides of face slenderly white. Palpi pale orange, second joint with apical and anterior margins, and an inner semicircular mark parallel to these, blackish-grey, base white beneath. Antennæ pale orange. Thorax whitish-ochreous, with a stripe on each side of back, and both margins of patagia orange. Abdomen whitish-ochreous, with an orange stripe on each side of back coalescing posteriorly, margins of posterior segments silvery-white, with a black dot before apex. Legs whitish, anterior pair orange, tarsi banded with white. Fore wings elongate-triangular, costa posteriorly gently arched, apex obtuse, hind margin bowed, oblique; whitish-ochreous, yellowish-tinged, with prismatic reflections; costa narrowly yellow-ochreous; five narrow deep orange fasciæ; first from base of costa to one-fourth of inner margin; second straight, from a black dot on costa at one-fourth to two-fifths of inner margin; third rather broader, straight, from a black dot beneath middle of costa to three-fifths of inner margin; fourth from a black dot on costa at three-fourths, parallel to hind margin, terminating abruptly below middle of wing; fifth broader, submarginal, irregularly attenuated and angulated outwards below costa; a narrow irregular pale purplish fascia between fourth and fifth, extending to inner margin; a slender deep orange hind-marginal streak; cilia whitish-ochreous, with an orange line near base. Hind wings with colour and cilia as in fore wings; three straight narrow deep orange fasciæ; first from beneath costa at one-third to two-thirds of inner margin; second broader, from

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beneath costa beyond middle to anal angle; third immediately before hind margin from apex to below middle, where it is attenuated to a point; a narrow pale purplish fascia between second and third; a fine dark purplish hind-marginal line.

Port Moresby (*Kowald*); one specimen. Also from Ceylon.

CONCHYLODES, *Gn.*

155. *Conchylodes abdicalis*, Walk.

One specimen (*Sayer*).

NOTARCHA, *Meyr.*

156. *Notarcha erixantha*, Meyr.

Port Moresby (*Kowald*); three specimens.

157. *Notarcha paraphragma*, n. s.

♀, 31 mm. Head, palpi, antennæ, thorax, abdomen, and legs ochreous-yellow; apex of anterior tibiæ fuscous. Fore wings elongate-triangular, costa gently arched, apex obtuse, hind margin rounded, oblique; ochreous-yellow; markings fuscous; a transverse interrupted mark near base, not reaching margins; lines thick, fascia-like, rather irregular; first from beyond one-fourth of costa to one-third of inner margin, obtusely angulated above middle, with a triangular central projection inwards; second from before three-fourths of costa to two-thirds of inner margin, somewhat curved outwards on upper half; a transverse mark in middle of disc, connected beneath with middle of second line by an ill-defined suffusion; an irregular subterminal series of very small indistinct cloudy spots, connected with second line by a thick bar above middle, and another above inner margin; cilia ochreous-yellow. Hind wings light ochreous-yellow; two or three grey marks towards anal angle, obscurely indicating parts of second and subterminal lines; cilia ochreous-yellow.

One specimen (*Sayer*).

158. *Notarcha halurga*, Meyr.

Port Moresby (*Kowald*); one specimen.

EPICHRONISTIS, *Meyr.*

159. *Epichronistis acrospila*, Meyr.

One specimen (*Sayer*).

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HELLULA, *Gn.*

160. *Hellula undalis*, F.

Port Moresby (*Kowald*); three specimens.

BOTYS, *Tr.*

161. *Botys incoloralis*, Gn.

One specimen (*Sayer*).

MECYNA, *Gn.*

162. *Mecyna eximialis*, Walk.

Scopula eximialis, Walk., Suppl. 1471.

♀, 23 mm. Head, palpi, antennæ, and thorax light orange; palpi 2, base white beneath. Abdomen ochreous-yellow. Legs ochreous-whitish, anterior pair ochreous-yellow, tarsi banded with white. Fore wings rather elongate-triangular, costa gently arched, apex obtuse, hind margin rounded, oblique; light orange; a very faint hardly darker slender denticulate line from two-thirds of costa to two-thirds of inner margin, upper three-fifths strongly curved outwards; cilia white, with a blackish basal line. Hind wings ochreous-yellow, paler towards costa; cilia white, with an ochreous-yellow line.

Port Moresby (*Kowald*); one specimen.

EURYCREON, *Ld.*

163. *Eurycreon prionogramma*, Meyr.

Port Moresby (*Kowald*); two specimens.

164. *Eurycreon lamprodeta*, Meyr.

Port Moresby (*Kowald*); four specimens.

165. *Eurycreon massalis*, Walk.

Port Moresby (*Kowald*); one specimen.

METASIA, *Gn.*

166. *Metasia acharis*, n. s.

♂ ♀, 8—12 mm. Head, thorax, and abdomen whitish, coarsely and irregularly irrorated with dark fuscous. Palpi dark fuscous,

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beneath white towards base. Antennæ whitish, spotted with dark fuscous. Legs whitish, anterior and middle pairs banded with dark fuscous. Fore wings very elongate-triangular, costa slightly sinuate, gently arched posteriorly, apex obtuse, hind margin bowed, rather strongly oblique; whitish, more or less coarsely and irregularly irrorated with dark fuscous, sometimes wholly tinged with grey; markings blackish; four or five small spots on posterior half of costa; lines well-marked, rather irregular; first from one-third of costa to two-fifths of inner margin, somewhat curved outwards; second from three-fourths of costa almost to anal angle, thence abruptly bent round to beneath middle of disc, and again abruptly bent to inner margin at two-thirds, sinuate inwards above middle; two subquadrate spots more or less completely outlined in disc between these; a cloudy hind-marginal line; cilia whitish, with two cloudy dark fuscous lines, and more or less obscurely barred with fuscous on basal half. Hind wings with colour, second and hind-marginal lines, and cilia as in fore wings; a small blackish discal spot, touching bend of second line.

Port Moresby (*Kowald*); ten specimens.

HYDROCAMPIDÆ.

Paraponyx, *Hb.*

167. *Paraponyx turbata*, Butl.

Port Moresby (*Kowald*); one specimen.

Schœnobius, *Tr.*

In the fore wings vein 11 sometimes anastomoses with 12; but both anastomosis and separation occasionally occur in the same species.

168. *Schœnobius chionotus*, n. s.

♂, 15—18 mm. Head, palpi, antennæ, thorax, abdomen, and legs white; palpi 4; antennal ciliations 1; anterior legs dark grey above. Fore wings elongate-oblong, posteriorly somewhat dilated, costa hardly arched, apex round-pointed, hind margin slightly sinuate, oblique; 11 anastomosing with 12; snow-white, unicolorous. Hind wings snow-white.

Port Moresby (*Kowald*); two specimens. Superficially this species appears to be an ordinary *Scirpophaga*, but structurally it is a true *Schœnobius*.

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Scirpophaga, *Tr.*

Vein 11 of the fore wings sometimes anastomoses with 12. The patagia in ♂ form a rough erectly spreading tuft, sometimes greatly developed; this character seems to have been overlooked, but it is the best point of distinction from the preceding genus: the only other differential character is the relative length of the labial palpi, which in *Schœnobius* are generally very long, in *Scirpophaga* moderate or short, but between the nearest forms there is practically no difference in this respect. At present, so far as is known to me, the patagia afford a good character; but it may hereafter be found necessary to unite the two genera, which are identical in all other respects.

169. *Scirpophaga butyrota*, n. s.

♂, 22—23 mm., ♀, 29—37 mm. Head and thorax white. Palpi in ♂ 2, in ♀ 1½, white, in ♂ externally becoming dark grey towards base. Antennæ white, ciliations in ♂ 1. Abdomen in ♂ pale whitish-ochreous, in ♀ white, anal tuft very large, whitish-ochreous. Legs white, anterior pair dark grey above, all tarsi in ♀ greyish. Fore wings narrow-oblong, posteriorly somewhat dilated, costa slightly arched, apex round-pointed, hind margin in ♂ slightly rounded, in ♀ almost straight, rather strongly oblique; vein 11 anastomosing with 12; ochreous-white, unicolorous. Hind wings snow-white.

Port Moresby (*Kowald*); four specimens.

CRAMBIDÆ.

Thinasotia, *Hein.*

170. *Thinasotia œnochrois*, n. s.

♀, 16 mm. Head, antennæ, and thorax reddish-fuscous, face with short cone. Palpi 2½, reddish-fuscous, base white beneath. Abdomen light reddish-fuscous, becoming ochreous towards base, and dark fuscous towards apex, with a white ante-apical spot. Legs ochreous-white, anterior tibiæ reddish-fuscous spotted with yellow, anterior tarsi snow-white with a reddish-fuscous subapical band. Fore wings elongate-triangular, narrow at base, costa slightly sinuate, posteriorly moderately arched, apex rectangular, hind margin bowed, oblique; reddish purple-fuscous; lines very indistinct, slightly paler, margined on both sides with darker; first at one-third, slightly curved; second from a small white oblique spot on costa beyond two-thirds to two-thirds of inner margin,

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slightly angulated outwards in middle, sinuate inwards above middle; a small suffused white longitudinal spot immediately beneath costa before second line; a narrow white hind-marginal line, interrupted by a series of triangular black dots; cilia fuscous-reddish, terminal half rather dark grey. Hind wings thinly scaled, semi-transparent towards base, grey-whitish, towards hind margin narrowly suffused with fuscous and on veins posteriorly; an interrupted dark fuscous hind-marginal line; cilia pale fuscous, reddish-tinged.

Port Moresby (*Kowald*); one specimen.

HEDNOTA, *Meyr.*

171. *Hednota bifractella*, Walk.

Port Moresby (*Kowald*); five specimens.

PTYCHOPSEUSTIS, n. g.

Forehead flat, oblique; ocelli present; tongue developed. Antennæ three-fourths, in ♂—?. Labial palpi long, straight, porrected, rough-scaled, attenuated to apex. Maxillary palpi moderate, triangularly dilated with scales. Fore wings with veins 4 and 5 approximated at base, 8 and 9 stalked, 10 approximated to 9 at base. Hind wings 1; veins 4 and 5 from a point, 6 and 7 approximated at base, 7 anastomosing with 8 to one-third.

According to Snellen the antennæ of the ♂ are "very thick"; in his figure the artist appears to have made them pectinated. The species can certainly not be included in *Diptychophora*, in which he placed it.

172. *Ptychopseustis amænella*, Snell.

Diptychophora amænella, Snell., Tijd. v. Ent., 1880, 247; ib., 1883, pl. v., 9.

Port Moresby (*Kowald*); one specimen (♀). Also from Celebes.

GALLERIADÆ.

HETEROMICTA, *Meyr.*

173. *Heteromicta rufivena*, Walk.

Port Moresby (*Kowald*); two specimens.

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HYPONOMEUTIDÆ.

ENÆMIA, *Z.*

174. *Enæmia parallela*, n. s.

♂, 24 mm. Head pale yellow, crown suffused with orange-red except on sides. Palpi orange-red. Antennæ fuscous, towards base reddish. Thorax pale yellow, reticulated with red. Abdomen orange. Legs orange-red, basal half of tibiæ and first joint of tarsi pale yellow, posterior pair wholly orange. Fore wings elongate, moderate, costa moderately arched, apex rounded, hind margin obliquely rounded; pale yellow; all veins strongly marked with red lines; two transverse oblique red lines near base, second only reaching middle; a red streak, mixed with fuscous, along basal fourth of costa; two moderate irregular straight rather dark purple-fuscous fasciæ, partially mixed with red, first from middle of costa to inner margin near base, second from costa before apex to three-fourths of inner margin, marked in disc with slender pale yellow lines between veins; a broad rather dark fuscous bar, margined with red, from above middle of first fascia to below middle of second, marked with two slender pale yellow lines, and a rather narrower bar from second fascia above middle to hind margin; cilia pale yellow (imperfect). Hind wings and cilia orange.

One specimen (*Sayer*).

175. *Enæmia mactata*, Feld.

Mieza mactata, Feld., Reis. Nov., pl. cxxxix., 44.

One specimen (*Sayer*).

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XXI. *On the distribution of the* Charlonia *group of the genus* Anthocharis. By George T. Baker, F.L.S.

[Read September 4th, 1889.]

This small division of desert species of the genus *Anthocharis*, forming a very natural and closely allied group, presents many points of interest, both in their relationship to each other and in their geographical distribution. They are only six in number, but range from the Canaries on the west to the Valley of the Indus in the east, and though found in such places as Lambessa in Algeria, and Malatia in Armenia, cannot be considered as otherwise than desert insects, being always found in the vicinity of country having either desert or semi-desert characteristics. They form of themselves two natural subgroups, *viz.*, white and yellow, the species of which I will tabulate and describe thus:—

Yellow.	White.
Charlonia, Donzel. Algeria; Tunis; Fortaventura.	*Penia*, Frr. Asia Minor; Caspian district.
Var. *Mesopotamica*, Stgr. Malatia (Asia Minor).	*Tomyris*, Chr. Askhabad.
Lucilla, Butler. India (N.W. Punjab).	*Pechi*, Stgr. Algeria.

Charlonia, Donz.

The fore wings are pale lemon-yellow, with the blackish discoidal spot of an irregular quadrangular shape. The apical patch varies in hue from brownish to almost black, likewise in extent; it is of a somewhat hollowed (internally) triangular shape, with the usual transverse spotted band more or less developed; costa pinkish, with rosy fringes. The hind wings are of the same lemon hue, but with the dark greenish under side showing through. Fringes whitish. Base of all the wings dark grey. Beneath the fore wings are pale yellowish, with the discoidal spot smaller and reniform in shape. The apical patch is greenish yellow, of the same shape and dimensions as the upper surface. Costa and fringes

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rosy, the hinder third of the former being dotted with very pale lemon. The hind wings are greenish, very finely and densely irrorated all over with grey, and spotted more or less markedly on the posterior margin with whitish, with a small central whitish spot, between which and the anal angle are two more whitish dots close together. My smallest specimen measures 28 mm. in expanse, and the largest 37 mm.

I have two ♀ ♀ which differ in no way whatever from the ♂, and I learn that the two sexes are precisely similar.

This species was first described and figured by Donzel in the 'Annales Soc. de France,' 1842, pp. 197, 198, pl. 8, fig. 1; also, under the name *Levaillantii*, by Lucas in the same work, 1847, pp. xlix and l; and in 1850, p. 92, pl. 2. This same author again described it in detail and figured it in the 'Exploration de l'Algérie,' pp. 348, 349, pl. 2, fig. 1. The characteristics on which he relies for the separation of his *Levaillantii* from Donzel's *Charlonia* will not, however, hold good, *viz.*, the pink costa, the larger apical patch, and the discoidal spot being surmounted by another small spot between it and the costa. These points are extremely variable, and in a large series it would be quite impossible to separate them, so that they are certainly insufficient to permit of even a varietal name. Mons. Oberthür assures me that Donzel's and Lucas's insects are one and the same species. *Levaillantii* must therefore sink as a synonym of *Charlonia*, Donz. It is by no means uncommon in Algeria, has occurred in Tunis, and quite recently two perfectly typical specimens have been sent to the National Collection from Fortaventura in the Canaries.

Var. *Mesopotamica*, Stgr.

The difference between the upper side of this and *Charlonia* is slight; the discoidal spot is less angled, whilst the apical patch is more extended along the posterior margin towards the anal angle. The fore wings are, however, decidedly rounder in shape, this being caused by the costa being somewhat deflexed posteriorly just in front of the apex. On the under surface the difference is more marked; the fore wings are yellower, and the discoidal spot [illegible]nt, this spot on the upper surface only showing through very [illegible]tinctly; the apical patch is pale greenish yellow, densely [illegible]ated with grey. The hind wings are pale yellowish green,

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densely irrorated with light grey; they are decidedly paler than in *Charlonia*, and much less spotted than in that species. *Mesopotamica* is also a larger insect than Donzel's species, measuring from 36 to 44 mm.

This variety is as yet only recorded from Armenia; my specimens were all taken at Malatia.

Lucilla, Butl.

♂. Fore wings pale gamboge-yellow, the blackish-brown discoidal spot large, with the dark apical patch extending more than three-quarters down the posterior margin, and angled interiorly in the same manner as *Penia*, the spotted transverse band herein being more or less distinctly marked. Costa and fringes pink. Hind wings same colour as fore wings, the base of all being blackish. Beneath the fore wings are decidedly paler yellow, and the discoidal spot is smaller than above, with the apical patch showing through as a dark dusting, of the same shape as on the upper surface. The hind wings are also paler yellow, with only a very slight dusting indeed of dark scales on the posterior margin; the central white spot and spotted margin as in *Charlonia*. This description is taken from Butler's type, but from the series now in the National Collection, numbering in all fourteen ♂♂ and ♀♀, it may be well to add somewhat respecting the under surface to it; the apical patch is sometimes more darkly dusted than the type, and also the hind wings occasionally approach near to the hue of *Charlonia* in being finely irrorated with grey, giving them the colour of yellowish grey, instead of the very decided yellow of the type.

♀. The fore wings of ♀ are very pale whitish sulphur, with the blackish discoidal spot very large indeed, extending right down to the inner margin of the cell, being broad in proportion, and of a roughly quadrangular shape; the blackish apical patch is also very large, angled as in ♂, and extending broadly even lower down the posterior margin than in that sex, with only just a trace of the transverse spotted band. Hind wings yellow, with the least trace of a greenish tinge, and with a broad border of dark dusting all round the posterior margin. Beneath the ♀ differs in no way whatever from the ♂, even the discoidal spot being no larger, though so large on the upper surface.

The females in the National Collection are very interesting, as they vary much in coloration, one being almost quite white, whereas the extreme in the opposite direction is very yellow.

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This species is a close ally of *Charlonia*, but the whitish ♀ at once separates it, together with the very large discoidal spot and apical patch; in the ♂ also these two latter characters are decidedly larger than in *Charlonia*, and the under surface of the hind wings is often quite yellow, and when irrorated with grey is never nearly as dark as in Donzel's insect.

All the fourteen examples in the National Collection were sent from the same neighbourhood, *viz.*, Campbellpore, Attack Bridge, Akhor, and Khairabad, the earliest specimen being labelled April 18th, 1886, and the latest June 27th, 1886.

The whitish ♀ is of great importance in our study of this small group, in pointing out which of the two forms, the white or the yellow, is in all probability the ancestral species.

Penia, Frr.

This species is—of the white group—the most nearly allied to *Charlonia*. It is of a whitish colour, slightly tinged with pale sulphur. The discoidal spot is brown, and in shape is a regular quadrangle. The apical patch is greyish brown, deeply and obtusely angled, extending fully three-quarters down the posterior margin; the spotted transverse band is angled in like manner. The hind wings are more sulphurous, and exhibit the dark under side through. Both wings are slightly greyish at the base. Costa pink. Fringes greyish at apex, tinged with pink at anal angle. Beneath the fore wings are whitish, tinged with sulphur on the costal half, with the discoidal spot smaller, scarcely extending beyond the costal margin of the cell. The apical patch is pale greenish yellow, closely and finely irrorated with grey; the costa and fringes pinkish, the former very lightly dotted within the apical area. The hind wings are yellowish green, finely irrorated with pale grey; the central whitish dot is small, sometimes rather indistinct; the posterior margin is slightly spotted; and there is scarcely more than a trace of the two spots between the central spot and the anal angle.

This species was first described by Freyer in his 'Neue Beiträge,' vi., p. 149, pl. 574, from a single broken specimen without name or locality; it was subsequently found by Staudinger at Malatia, and by Christoph in N. Persia and Turkestan, and I have specimens from Krasnovodsk, on the Caspian; so that [illegible]ably ranges all through Northern Asia Minor and

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Persia up to the edge of the Khivan Desert. I would draw your attention to the fact of its occurrence at Malatia, as we see here the whitish *Penia* and yellow var. *Mesopotamica* overlapping each other.

Anthocharis Tomyris, Chr.

♂. The fore wings are white, with a pale sulphurous tinge; the discoidal spot is reduced to a minimum, and is triangular in shape, the base thereof being angled inwards. The costa is broadly greyish from the disco-cellular vein to the margin, extending from the base of wing to the discal spot; the apical patch is pale greenish grey, much reduced in size, and extending further along the costa than down the posterior margin, with no trace of the transverse band, but there are four small yellowish dots on the costa within this area. Costa pale pinkish; fringes slightly tinged with pink. The hind wings are rather yellower in colour than the fore wings, showing the dark under side through, and also exhibiting through the single whitish central spot of the under surface. The roots of all the wings are blackish. Beneath the fore wings are paler than above, with the greyish discal spot smaller. The apical area is yellowish green, finely irrorated with brownish grey. The hind wings are greenish, very finely irrorated with brownish grey, with a single whitish dot in the centre, on the posterior margin of the median cell.

♀. This sex is quite remarkable in the pattern of its fore wings, which are sulphurous greyish white, with the dark grey discoidal spot very large, roughly quadrangular, and extending nearly half across the wing, and right up to the costa, from whence to the roots the costa is broadly bordered with grey. The apical patch is dark grey, large, extending broadly right down the posterior margin almost to the anal angle, which angle is dusted with dark scales extending upwards and connecting the dark margin therewith. The whole of the inner margin is likewise more or less dusted with dark scales. The costa is finely pinkish. Hind wings greyish sulphurous yellow, slightly dusted with dark scales, which are particularly noticeable round the posterior margin and along the inner edge of the median cell. Fringes of both wings slightly rosy. Beneath the fore wings are whiter than above, the discal spot showing through almost as large as above; the costa is grey from this spot to the base, and has an internal broad border of yellow, which is continued up to the apical area; this apical patch follows the shape of the upper surface very closely, but is yellowish, finely and densely irrorated with brownish grey, the irrorations

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becoming less close down the posterior margin to the anal angle. The hind wings are yellowish green, very finely irrorated with brownish grey, with the single central whitish spot as in the ♂. In both sexes the wings are somewhat rounder than any of its near allies, this being specially noticeable in the ♀. ♂ 43 mm., ♀ 39 mm.

This beautiful species was described and figured by Christoph in vol. i., p. 99, pl. vi., fig. 1, of those finely-executed Memoirs by the Grand Duke Romanoff. It has only hitherto been recorded from Askhabad, and is the largest of the group, the two specimens before me measuring, ♂ 43, ♀ 39 mm., the ♂, contrary to the rule, being the larger of the two. Christoph gives 22 mm. as his measurement; this must refer to the one wing, not the alar. expanse usually meant.

Anthocharis Pechi, Stgr.

Anterior wings white, with the discoidal spot grey, and of an irregular quadrangle in shape; the apical patch is also grey, with a small indistinct whitish spot just in front of the apex. The costa is broadly greyish from the discal spot to the base; base of all wings blackish. The posterior wings are whitish, the dark under side showing somewhat through. Beneath the apex of the anterior wings is greenish yellow, finely irrorated with dark grey; the discoidal spot, which appears through but faintly, is pale grey, with a whitish crescent therein. The posterior wings are greenish yellow, more intensely irrorated with grey, and having the single small whitish spot in the centre. The collar is pale lemon-colour; antennæ grey tipped with lemon. Fringes white, greyish at apex. ♂, 32—33 mm.; ♀, 36 mm.

This interesting species was first taken by Wilhelm Pech, of Budapest, at Lambessa, in April, 1884, and was described by me in the Ent. Mo. Mag., vol. xxi., p. 241. My friend Dr. Staudinger, however, likewise published a description (under the same name), which, owing to a little misunderstanding, appeared somewhat earlier in the 'Ent. Nachrichten'; hence the two descriptions appearing so close together.

This insect can be recognised at a glance from any of its predecessors; the apex is more acute, and the posterior margin straighter; it is also much whiter than either *Penia* or *Tomyris*. As yet it has only been taken at Lambessa, where it appears to be very rare, as it has, I believe, only been taken in 1884, when M. Oberthür's

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collector took it at the same time as Pech did. Dr. Staudinger did not find it during his expedition there the year before last.

The distribution of the several species is therefore—Yellow Group: N.W. India; Armenia; Algeria; Canary Isles. White Group: Askhabad; Turkestan; N. Persia to Armenia and Algeria.

Consequently Armenia and Algeria are overlapping areas. This discontinuity is very peculiar, and I will therefore review all the data which I have been able to obtain, and see how it can be accounted for.

We find both the white and yellow forms inhabit the same line of country, the most distinct species being found furthest east and west, both being yellow; whilst the two very distinct white species, *Tomyris* and *Pechi*, are likewise found to obtain within a limited area almost as far from each other as their yellow allies. The varieties taken in the intervening localities are in each instance a sort of connecting-link between the extreme forms.

To obtain the desired evidence it is necessary to go back to the early Tertiary times, and see what Geology teaches us. At this period a tropical or subtropical climate extended from the Pole to the Tropic of Cancer with but little variation. The temperature then began to decline gradually, till it culminated in the Glacial Epoch, with which the Quaternary Era opens; this refrigeration was followed by a secular increase of temperature, which is supposed to have continued with comparatively unimportant variation to the present day.

We must now look to the fauna of those days for assistance, the Mammalia of which will be sufficient for our present purpose.

In a gravel-bed near Madrid the remains of the striped hyæna and elephant, both African animals, have been discovered. The bone-caves of Gibraltar have yielded many species, such as the lion, lynx, spotted hyæna, and serval, the two latter being now only found in Africa. The Sicilian bone-caves have also yielded the elephant, lion, and spotted hyæna.

The hippopotamus (*H. major*) lived in England, France, Spain, Sicily, Italy, and Africa; whilst, curiously, an extinct South European elephant (*E. meridionalis*) has

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been found in Algeria, whither it must have travelled from S. Europe.*

Now of the northern Mammalia, the mammoth is the only one recorded from Spain; it also existed in parts of France and Northern Italy (range not definitely known),† but in the caves of Perigord and others in Central France the bones of the reindeer and musk-sheep, as well as the mammoth, have been discovered.

From all these facts we must conclude that in the Pleistocene, post-Pliocene, or Quaternary Era (as it is variously called), North Africa was united with Spain on the one hand and Sicily on the other.

Dumont represents—in his 'Carte Gêologique de l'Europe'—that the strata opposite each other at Capes Spartel and Trafalgar are both of Eocene age, and that at one time they were continuous; consequently the union there was owing to a post-Eocene elevation. It may, however, have been due to a post-Miocene upheaval, as Miocene strata occur in Algeria; whilst the first connection between Asia Minor and N. Africa was probably in the earlier Pliocene times, after which union there must have been a subsidence below the sea-level when the later Pliocene beds which cover half Sicily were deposited; then again the land connection was re-established at the time of the elevation of Etna and Vesuvius, thus forming a migratory line for the fauna of the post-Pliocene period.

Here we see, then, two lines of migration to N. Africa from Europe, the one by way of Spain and Morocco, the other *viâ* Tunis and Sicily.

Geologists usually adopt the following plan of arriving at the land contour of this period, *viz.*, by raising the land bodily 500 fathoms; this would unite North Africa and the Balearic Isles with Spain, Corsica with Tuscany, Tunis with Sicily, and the heel of Italy with European Turkey; it would also convert the Ægean Sea into dry land, and make one great tract of land from Asia Minor to Greece, North Syria being united therewith by way of Cyprus and Crete. The Mediterranean would thus be converted into two great salt-water basins.

* "Geology of Gibraltar," Ramsay & Geike; 'Quart. Journal Geol. Soc.,' p. 505, vol. xxxiv. "Pleistocene Mammalia," Dawkins; Pal. Soc.: 'Cave Hunting,' ch. x.

† Leith Adams, 'Quart. Journal Geol. Soc.,' p. 587, vol. xxxiii.

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Mr. Mathews, comparing certain features in the Algerian flora,* informs us that there are in Algeria 272 species of Oriental plants not occurring in Sicily; and he further goes on:—"The question is by what route did they travel between North Africa and the Levant? If we examine the eastern distribution of these species we shall find that many of them occur in Greece, European Turkey, East Germany, South Russia, Asia Minor, and Syria, or some of these countries; others again in Egypt, Arabia-Petræa, and Arabia, the remainder in both these regions. At least half of the 272 species are absent from the southern side of the Levant, and *must have migrated from the north of the Levant and North Africa*, or *vice versâ*. Among the species which have travelled along this line, but have not passed into Europe, one may be particularly mentioned, one of the most interesting in its distribution, as it is one of the noblest of the creations of the vegetable world,—I mean the cedar of Lebanon. This magnificent tree, which unhappily may be said to linger rather than flourish in the Algerian Atlas, is found scattered in scanty patches in several parts of the chain, but nowhere in abundance except at Batna, and in the celebrated forest at Teniet el-Haad. The Atlantic cedar is a distinct variety of the cedar of Lebanon, and has been described under the name *Cedrus atlantica*. The nearest point to North Africa where the cedar is again met with is on the mountains of Cyprus, where it was discovered by Sir Samuel Baker in September, 1879. Sir Joseph Hooker considers the Cyprus cedar another variety of the cedar of Lebanon, and names it var. *brevifolia*. Another cedar nearly allied to the *Cedrus Libani* is the *Cedrus deodara* of the Himalayas. The differences in race in the Algerian, Cyprus, and Lebanon cedars imply a great lapse of time since their habitats were severed.

"One explanation, and one alone, will account for these phenomena of distribution. Sicily, geologically speaking, is of very recent origin. Before its existence the ranges of the Atlas must have extended into Greece. It is not necessary to suppose that the cedar and other species travelled in a direct line between North Africa and Syria,

* 'Flora of Algeria,' p. 80, by Wm. Mathews, M.A., F.R.S.

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as they may have radiated into their present habitats from some point further to the north. I incline, nevertheless, to the belief that the Atlantic chain extended from North Africa to the Lebanon, and that the mountains of Crete and Cyprus are surviving fragments of it."

We are thus provided with a land route for migration from Algeria to Malatia.

Now, resuming the thread of our argument, we may assume that a white or yellow *Anthocharis* was generally dispersed in suitable localities over the whole of this area. We may, I think, further assume that the then dominant form was white, and that during the subsequent great secular depression of temperature it was driven to certain isolated points, owing to the great struggle for existence consequent on the migration southward of all life. Then followed the amelioration of temperature, the gradual reflex movement of life, and the subsidence of the Mediterranean area giving Europe her present geography.

It now becomes advantageous, if not absolutely necessary, if the species is to continue to exist, for a hardier form to be produced, and gradually therefore the yellow form is evolved, which in time becomes, as at present, the dominant race, and in the far east (N.W. Punjab) entirely supplants the ancestral stock; though I must here mention that the ♀, being the last to assimilate itself, has scarcely even yet completed its transformation, as it is not uncommon to see an almost white specimen. In Armenia we have apparently the most recent emanation of the yellow form—var. *Mesopotamica*—existing side by side with the whitish *Penia*. But *Penia* itself appears to be in a state of transition, for it is always more or less tinged with sulphur; and this forces the conclusion that *Penia* is in process of change towards the yellow form. Again, *Tomyris* is even more sulphurous than the preceding species, and though very distinct in shape and pattern of wings, inhabiting the mountains of Askhabad without any contact with the yellow group, yet it does not seem improbable that it may be assimilating itself in coloration to the present dominant race.

We now come to the two very distinct species existing side by side in Algeria, viz., *Pechi* and *Charlonia*. It is curious that in this country, which appears to be the

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western headquarters of the yellow form, these two distinct species, the white *Pechi* and the yellow *Charlonia*, should obtain. The former, however, is very rare, whilst the latter is common: this shows that the one has not the power of assimilation; consequently selection comes in, keeping the two species distinct, but working to the detriment of the one and to the advantage of the other, so that probably the one is on its way to extinction.

The latest record of *Charlonia* from the Canary Islands is very interesting, but perhaps not surprising. The two specimens sent to the National Collection differ in no way from those taken in Algeria. It is most probable that when Marocco is more explored this species will be found all down the north-west coast of Africa, whence it is easily understood how it found its way across the very narrow strip of intervening ocean.

We may, I think, safely conclude that the present distribution of this little desert group of *Anthocharis* has been brought about in the manner here suggested.

PS.—Since writing the above I have received vol. v. of Romanoff's Memoirs, in which Christoph says that a larger number of *Tomyris* have been received, and that the males are more strongly tinged with yellow than the one figured in vol. i. This supports my view that *Tomyris* may be gradually assimilating its colour to that of the *Charlonia* subsection of this subgroup. Christoph further says that Staudinger considers that *Pechi* is probably a Mauritanian variety of *Tomyris*. With this, however, I cannot agree, as the wings are very different in shape, *Tomyris* having the apex decidedly rounder and wing broader proportionately. Furthermore, the general appearance of the two insects is quite dissimilar, as may be gathered from the foregoing descriptions.

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XXII. *A revision of the genus* Argynnis. By Henry J. Elwes, F.L.S., F.Z.S., &c.

[Read September 4th, 1889.]

The genus *Argynnis* is one that I should consider as highly typical of the palæarctic region, in every part of which it is found; and usually as a genus dominant both in number of species and individuals. Though not quite strictly confined to the region, yet there are good reasons for considering the little group which occurs in Chili as aberrant, and only two species inhabit tropical regions. In the Old World the only subregions which seem deficient in Argynnides are the Mediterraneo-Persic and the Mongolian, whilst in North America the distribution of the genus is confined to those parts which have a severe winter climate, and it is in consequence absent in the Gulf States and Texas, and scarce in the more arid regions of New Mexico, Arizona, and Colorado.

The difficulties in this genus are not so great as in *Colias* and *Erebia*, except in the species inhabiting the Rocky Mountain and Pacific States of North America, which run into each other in a most extraordinary manner. Most of the European species, though closely allied to each other, are very fairly distinct, and I have only marked one species out of America as doubtful.

I regret to have to differ so often from Mr. W. H. Edwards, who has done so much to make the butterflies of his country known to science; but though his later views, as expressed in such papers as he has written on *Pieris napi* and its vars., 'Papilio,' vol. i., p. 86, and on *Lycæna pseud-argiolus*, give evidence of a correct appreciation of the variation of species, he has in his earlier years created a great number of synonyms which I am sure he will one day regret.

I intended to have published this paper some years ago, but was stopped by the difficulty of understanding the American species. But having last year had the

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opportunity of visiting most of the principal collections in the United States, and finding that there seemed to be no prospect of getting a better knowledge at present, I have thought it better to publish the notes I have made, which are based on a study of very complete materials.

My own collection contains specimens, mostly in fair series, of every species except *astarte*, *eugenia*, *columbia*, *inornata*, and *carpenteri*, and I have seen the types of the first three of these, whilst I cannot recognise the last two as species.

I do not expect to see any addition of importance to the genus, as the regions which they inhabit, excepting Arctic and North-eastern Asia, are pretty well known, but the life-history of most of the species is still unknown, and Northern and Central China may perhaps add some species to the list.

In the abbreviations of my synopsis I have followed Staudinger and Edwards' catalogue pretty generally, so that a reference to one or the other of them will explain any which may not be generally understood.*

The genus *Argynnis* was founded by Fabricius in 1807. Hübner, in the 'Verzeichniss Bekanter Schmetterlinge' in 1816, divided it into five sections, based on the shape of the wings and the colour of the under side, and included insects of other genera such as *Melitæa* and *Agraulis*.

Ochsenheimer, in the 'Schmetterlinge von Europa,' vol. iv., p. 16, in 1816, first properly defined it, and Doubleday, in his 'Genera of Diurnal Lepidoptera,' considers him the author of the genus. Its characters are given by Doubleday in full, and the following remarks made:—"The two sections composing this genus appear to me to be too closely allied to admit of their separation into distinct genera as I once thought advisable. The only constant difference is in the position of the subcostal nervules; for, though generally the species of the first section (*Argynnis*) differ slightly in the form of the palpi from those of the second (*Brenthis*), yet this difference is not constant. Moreover, as Westwood has remarked, the form of the palpi does not appear to be a character always to be relied on in this and the following genus."

* An asterisk after a reference signifies, as in Edwards's Catalogue, that it refers to the preparatory stages of the insect.

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Most other authors have adopted the same view, in which I quite concur, because the position of the subcostal nervules is not the same in all the species of either section, and some, as *A. daphne*, *A. hecate*, *A. gemmata*, and *A. altissima*, have the second branch of the subcostal nervule given off so close to the end of the cell that it can hardly be said to which group they belong; while *A. clara*, which by de Nicéville is included in the first section of *Argynnis*, is in my opinion more closely allied to *gemmata* than to any other, and has the second branch emitted beyond the cell. The South American species have the venation as in *Brenthis*, and except *modesta*, Blanch., differ from all the European species in the straight or slightly concave fore margin of the hind wings. *Lathonia* and *bellona* have somewhat the same shaped fore wings, but *epithore*, which is undoubtedly very near to, if not a variety of, *bellona*, has the usual shape of the outer margin, and some specimens of *bellona* seem intermediate.

Scudder has founded a new genus *Speyeria* for *A. idalia*, but as the description is not comparative, and extends over two closely-printed quarto pages, it is not easy to see in what it differs from *Argynnis*, except that the second subcostal nervule is emitted "at the end of the cell, or a little within the extreme limit of its upper border, which is here pushed outward a little" instead of before it, as in *Argynnis*, or beyond it, as in *Brenthis*, both of which he adopts as genera.

On examining my eight specimens of *idalia*, however, I find that in all of them the second subcostal nervule is emitted distinctly before the end of the cell, not so much perhaps as in some *Argynnis*, but more than in others. And the grouping of species on such a character as this will lead to such impossible results, from all other points of view, and especially from that of their geographical distribution, that I cannot accept it, and prefer to retain all the species in one genus.

Moore, in the 'Lepidoptera of Ceylon,' has adopted Hübner's name *Acidalia* for *A. niphe*; as usual, without giving the points of difference between it and *Argynnis* proper; and though perhaps it has a different aspect to any other species, and by its geographical distribution is a tropical insect, I think it best to keep it in the genus.

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With regard to the Chilian species, I am more doubtful. They seem by their shape and venation to be nearer to *lathonia* than any other species, but their under side is quite peculiar in marking, and moreover the different species are not very similar in type.

Genus ARGYNNIS, *Fabr.*, Ill. Mag., vi., p. 283 (1807); Ochs., Schmett. Eur., iv., p. 16 (1816); Doubl. Hew., Gen. Di. Lep., i., p. 171 (1848).

BRENTHIS, *Hb.*, Verz., 30 (1816); SPEYERIA, *Scudd.*, Syst. Rev., 23.

APHIRAPE, *Hb.*, 23—25 (1798?).	*Germ.; Bav. Belg. or.; Ross c.; Arm.*
var. inconstans *ossianus*, Hbst., x., p. 98, t. 270, 4, 5 (1800); Schilde, S. E. Z., 1872, p. 175* (typ. minor, supra obscurior, subt. mac. albis sive argenteis).	*Lap.; Ross. bor.; Amur sup.; Hudson Bay, Labrador.*
var. inconstans *triclaris*, Hb., Zutr., vol. ii., t. 19; Edw., Cat., No. 142 (1885); *ossianus*, Boisd., Ic., 19, 1, 3 (typ. minor, supra dilutior, subt. mac. albis sive luteis).	*Amur inf.* (*Graeser*); *Colorado*, 10,000 *ped. alt.*; *Rocky Mts. alp.*
HEGEMONE, *Stgr.*, S. E. Z., 1881, p. 292; Alph., Lep. Kuldj., p. 74, t. xv., 16, ♂, 17, ♀.	*Alatau, Thianshan, Margilan*, 4—6000 *ped. alt.*
SELENE, *Schiff.* S. V., p. 321; Hb., 26, 27; Buckl., Ent. Mo. Mag., vii., p. 114, 1869.*	*Eur.* (*excl. And. Sard. Cors. et Græc.; Arm.; Alt.; Asia bor. et or.; Korea.*
? var. *kela*, Stgr., S. E. Z., 1861, 347. (minor, supra obscurior, nom. vix conservandum).	*Scand. bor.; Asia bor. ad* 68° *N.*
OSCARUS, *Ev.*, Bull. Mosc., 1844, iii., 588, t. 14, 1, *a b.*	*Prov. Irkutsk; Amur sup. et inf.*
var. *australis*, Graes., Berl. Ent. Zeit., 1888, p. 90 (major, pallidior, minus distincte notata, *fide* Graeser).	*Vladivostock.*
IPHIGENEIA, *Graes.*, Berl. Ent. Zeit., 1888, p. 90 (? bona sp., an transitus ad *euphrosyne* vel *selene*).	*Nikolaievsk* (*Amur inf.*); *Korea.*
? *Brenthis perryi*, Butl. Ann. Nat. Hist., 1882, p. 16.	

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* In referring to Edwards's Catalogue, I mean the Revised Catalogue, issued as a separate publication by the American Entomological Society, Philadelphia, 1885.

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EUPHROSYNE, *Linn.*, S. N., x., 481; Esp., 18, 3, 72, 3.	*Eur. (exc. Ib. Sic. Sard.Cors.); Arm. Alt.; Asia bor. ad. 70° N.; Amur sup. et inf.*
var. et ab. *fingal*, Hbst., x., p. 92, t. 270, 1, 3 (minor obscurior).	*Scand. cent. et bor.; Alps (rarius).*
MYRINA, *Cram.*, Pap. Ex., ii., t. 189, B, c (1779); Edw., Cat., p. 30; Edw., Can. Ent., i., 55 (1869); Scudd., Butt. N. E*., p. 593, t. 4, 5.	*U. S. Am. bor. or.; Brit. Am.; Rocky Mts.; Alaska.*
ALTISSIMA, *Elwes*, P. Z. S., 1882, p. 403, t. xxv., 8, ♂; de Nicé., Butt. Ind., ii., p. 139.	*Sikkim bor. sum. alp.*
GEMMATA, *Butl.*, Ann. Nat. Hist., 1881, vii., p. 32, t. iv, 1; Elwes, P. Z. S., 1882, p. 404, t. xxv., 6, ♂, 7, ♀; de Nicé., Butt. Ind., ii., p. 138.	*Sikkim bor. alp.; Ladak or.?*
CLARA, *Blanch.* Jacquem. Voy. iv. p. 20, Ins. t. ii., 2, 3 (1844); de Nicé., Butt. Ind., ii., p. 136.	*Prov. Gurwhal (N. W. Him.), 12,000 ped. alt.; ? Kashmir.*
JERDONI, *Lang*, Ent. Mo. Mag., v., p. 34 (1868); de Nicé., Butt. Ind., ii., p. 140. *cashmirensis*, Moore, P. Z. S., 1874, p. 267, t. 43, 4.	*Kashmir 8—12,000 ped. alt.*
GONG, *Oberthür*, Et. Ent., ix., p. 15, t. 2, 9.	*Tibet or.*
PALES, *Schiff.*, S. V., p. 177; Hb., 34, 35. *sipora*, Moore, P. Z. S., 1874, p. 568, t. 66, 11; de Nicé., Butt. Ind., ii., p. 139, t. xviii., 72, ♂. *baralacha*, Moore, P. Z. S., 1882, p. 242, t. ii., 1, 1 *a*. var. et ab *isis*, Hb., 38, 39, ♂; ab ♀ *napæa*, Hb., 757, 8 (inconstantes nom. vix conservanda).	*Alp. Pyr. Eur. bor. Asia cent. ad 69° N.; Himalaya, occ. et or. mont.*
var. *generator*, Stgr., S. E. Z., 1886, p. 235.	*Turkestan mont.; Ladak.*
var. *caucasica*, Stgr., Her. Ross., 1870, p. 61.	*Cauc. mont.; Arm. mont.*
var. *græca*, Stgr., *l. c.*, p. 62, t. 1, 4.	*Græc. s. mont.*
var. *lapponica*, Stgr., S. E. Z., 1861, 347 (formæ geographicæ plus minusve constantes, cum trans. ad *pales* et ad *arsilache*).	*Scand. bor.; Amur inf.*
var.? bona sp. *arsilache*, Esp., 56, 5, ii., p. 35; *cf.* Stgr., S. E. Z., 1861, p. 347: Meyer-Dur, Schmett. Schw., p. 114 (al. ant. subt. nigro maculatis).	*Germ. pal.; Helv. val.; Scand.; Ross. bor. et cent. Sib. ad 70° N.*

* Scudder's 'Butterflies of New England,' Boston, 1889.

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CHARICLEA, *Schn.*, N. Mag., v., p. 588 (1794); Hb., 769—70; Stgr., S.E.Z., 1861, p. 348.	*Eur. Asia et Am. bor.; Labr.; Newfoundland; Rocky Mts.; Brit. Columbia.*
var. *boisduvalii*, Dup., i., p. 127, t. 20, 4; Edw., Cat., No. 147 (subtus minus albo variegata, inconstans, nomen vix conservandum).	
var. *obscurata*, M'Lach., J. Linn. Soc., 1878, Zool., 14, p. 110.	*Grinnell Land*, 80° *N.*
A. butleri, Edw., Can. Ent., xv., p. 32 (obscurior, forma arctica nomen vix conservandum).	*Kotzebue Sound* (*N.W. Am.* 67—68° *N.; Nova Zembla* (*fide Butler*).
MONTINUS, *Scudd.*, Proc. Essex Inst., 3, 166 (1862).	*White Mts., New Hampshire, U.S.A.*
A. chariclea var. *montinus*, Streck., Cat., p. 116.	
Brenthis montinus, Scudd., Butt. New Eng., 601, t. 5, 11.	
HELENA, *Edw.*, Trans. Am. Ent. Soc., iii., 268 (1871); Mead, Rep. Wheeler Exp., v., 757 (1875).	*Rocky Mts.*, 7000—13,000 *ped. alt.; New Mexico to Montana.*
SELENIS, *Ev.*, Bull. Mosc., 1837, 1, 10; H.-S., 154—5; Graes., Berl. Ent. Zeit,, 1888, p. 89.	*Ural centr. et mer.; Altai.*
? var. *sibirica*, Ersch., Bull. Mosc., 1870, i., p. 112 (supra obscurior, subt. multo vivacior).	*Amur sup. et inf.; Irkutsk; Sib. bor. ad* 65° *N.* (*Trybom*).
ANGARENSIS, *Ersch.*, Bull. Mosc., 1870, i., p. 112; Graes., Berl. Ent. Zeit., 1888, p. 94.	*Irkutsk; Amur sup. et inf.*
FREIJA, *Thunb.*, Diss. Ent., 2, p. 34, t. fig. 14 (1791); Hb., 55—6; Edw., Cat., No. 148.	*Eur. Asia*, 59° *ad* 70° *N.; Rocky Mts., Colorado; Montana; Am. bor. ad circa* 68° *N.*
? var. *tarquinius* (*Melitæa tarquinius*), Curt., App. Ross., 2nd Voy., p. 68 (1835), (? var. minor *arctica*).	*Boothia felix*, 70° *N.*
POLARIS, *Bdv.*, Ind., p. 15 (1829); Ic., 20, 1, 2; Schoyen, Norg. Arkt. Lep. (Arch. Math. og. Naturv., v., p. 156); Edw., Cat., No. 149.	*Labr.; Arct. Am. ad* 81° 52′ *N.* (*fide Edw.*); *Norv. bor.* 71° *N.*
AMATHUSIA, *Esp.*, 88, 1, 2 (1783), ii., p. 170.	*Germ. s. or. et mer.; Alp.; Ross. cent. et s.* (*excl. reg. pol.*) *Altai; Amur inf.* (*Graesser*).

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DIA, *Linn.*, S. N., xii., 785 (1766); Hb., 31—3.	*Eur. or. cent et m.; Gall.; It. cent. et s.; Bith.; Pont.; Arm.; Altai; Sib. centr.*
FRIGGA, *Thunb.*, Diss. Ent., 2, p. 33 (1791); Hb., 49, 50; Edw., Cat., No. 150; Schilde, S. E. S., 1873, p. 177.*	*Eur. Asia* 60° *ad* 70° *N.*
var. *saga*, Kaden MSS., Stgr., S. E. Z., 1861, p. 350; Streck., Cat., p. 117 (subt. obscurior, trans. ad *improba*, nomen vix conservandum).	*Rocky Mts., Col.; Labrador; Am. bor. ad circa* 63° *N.*
var. *improba*, Butl., Ent. Mo. Mag., 1877, 206 (var. *arctica*, minor; supra et subt. multo obscurior).	*Am. arct.* 67°—68° *N.* (*Richardson*); *Nova Zembla* (*Markham*).
BELLONA, *Fabr.*, Syst. Ent., p. 517 (1775); Scudd., Butt. New Eng., p. 608, t. 5, 13, 15.	*U.S. Am. bor. or. et Am. Brit.*
var. *epithore*, Bdv. MSS., Edw., Pr. Ent. Soc. Phil., ii., p. 504 (1864), (al. ant. apice minus prolongatis, marg. ext. rotundatis, basi minus suffusis; subtus pallidior).	*California, Oregon, Wash. Terr.; Col.* (*fide Mead*); *Alaska.*
var. ? *kreimhild*, Streck., Ruffn. Rep., 1878, p. 1854, t. 1, 5, 6, ♀ (pallidior, forma "terræ siccæ"; non vidi).	*Arizona; Utah.*
THORE, *Hb.*, 571—3.	*Alp. Germ. Helv. et Ped.; Asia bor. ad* 70° *N.* (*Trybom*); *Scand. centr.*
var. *borealis*, Stgr., Cat., 9; S. E. Z., 1861, 351 (dilutior; formæ intermediæ adsunt).	*Lap.; Altai; Amur sup. et inf.*
AMPHILOCHUS, *Men.*, Schrenk's Reise, p. 21, t. ii., 1; Graes., Berl. Ent. Zeit., 1888, p.	*Amur sup.* (*Pochrofka*).
ASTARTE, *Doubl. Hew.*, Gen. Di. Lep. t. 23, 5 (1848).	*Mtns. of British Columbia ?.*
INO, *Esp.*. 76, 1, *a*, *b* (1782), ii., p. 125.	*Eur.* (*excl. Angl. Bat. Ib. Græc. et ? It. m.*) *Bith.; Pont.; Altai.*
var. *amurensis*, Stgr., Rom. Mem., iii., p. 146; Graes., Berl. Ent. Zeit., 1888, p. 96 (pallidior, subt. al. post. violascens).	*Amur sup. et mer.* (*cum typus*); *Japan*, 5000 *ped. alt.*
DAPHNE, *Schiff.*, S. V., p. 177; Hb., 45, 46.	*Germ.* (*excl. s. occ.*); *Gall.; Hisp. c. Helv. mer. occ. It.; Eur. or. m.; A. Minor; Altai.*

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var. *rabdia*, *A. rabdia*, Butl., Ann. Nat. Hist., 1877, p. 98; Fixsen, Rom. Mem., iii., p. 304.	*Amur; Korea; Japan.*
var. *fumida*, Butl., Ann. Nat. Hist. (5), ix., p. 16 (1881), (paullo major; al. ant. magis excavatis; subt. al. post. magis cinerascentibus, formæ intermed. adsunt).	
HECATE, *Esp.*, 76, 3, *a*, *b* (1782), ii., p. 127.	*Eur. or. mer. (excl. Græc.); Gall. m.; It. s.; Hisp. cent. et m.; A. Minor; Cauc.; Altai.*
var. *alaica*, Stgr., S. E. Z., 1886, p. 236 ("pallidior, punct. nigris minoribus," *fide* Stgr., non vidi).	*Alai Mts.; Alatau.*
EUGENIA, *Ev.*, Bull. Mosc., 1847, ii., 68; Lep. Ross., t. 11, 1, 2; Trybom, Ofver. Vetensk. Acad. Forh., 1887, p. 45.	*Sib. or. bor. (prov. Irkutsk); Dudinska*, 69° *N.* (*Trybom*).
LATHONIA, *Linn.*, S. N., x., 481; Hb., 59, 60.	*Eur. (excl. reg. pol.); Canar.; Maur.; Asia occ. et centr.*
var. *isæea*, Gray, Lep. Nep., p. 11 (1846), sine descr.	*Himalaya, mont. et alp.*
lathonia, Koll., Hügel's Kash., iv., p. 440; Elwes, P. Z. S., 1882, p. 404; de Nicé., Butt. Ind., ii., p. 137.	
issæa, Moore, Cat. E.I.C., p. 156 (sine descr.) (subt. al. post. mac. arg. discali lanceolata non ovali; et angl. abdom. arg. fasciato non maculato).	
*CYTHERIS, *Drury*, Ill. Ex. Ent. ii., t. 4, 3, 4 (1773).	*Chili sept. med. et mer.*
Brenthis cytheris, Butl., Trans. Ent. Soc. Lond., 1877, p. 465.	
A. siga, Hb., Zutr., t. 677, 678 (1832).	
A. montana, Reed, Mon. Mar. Chilenas, t. 1, 6 (1877),	
*LATHONIOIDES, *Blanch.*, in Gay's Fauna Chilena, vii., p. 22, t. 2, 12 (1852).	*Chili sept. med. et bor. ad* 6000 *ped.* (*fide Reed*).
? *anna*, Blanch., *l. c.*, p. 23.	
? *A dexamene*, Boisd., Bull. Soc. Ent. Fr., 1859, p. 157.	*Rep. Argent.*
B. lathonioides, Butl., Trans. Ent. Soc. Lond., 1877, p. 466.	
A. anna, Reed, Mon. Mar. Chilenas, p. 29.	

* *Cf.* Berg. Ann. Soc. Arg. xiii., pp. 164—5 (1882), qui *dexamene* nom. specif. pro *lathonioides* preferet.

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MODESTA, *Blanch.*, *l.c.*, vii., p. 24, t. 2, 3, 4. *Brenthis modesta*, Butl., *l. c.*, p. 466. *A. modesta*, Reed, *l. c.*, p. 32.	*Chili mont.* 8000—10,000 *ped.* (*fide Edmonds*).
HANNINGTONI, sp. nova.	*Taveta prope montem Kilimanjaro; Africa centr.*
ELISA, *God.*, Enc. Meth., p. 817 (ed. 1823?); Dup., i., 18, 3, 4, p. 114. *cyrene*, Bon., Descr., p. 175 t. i. i. (1824); H. G., 822, 5.	*Corsica; Sard.* (*terris calc. restricta*).
ALEXANDRA, *Men.*, Cat. Reis. p. 246 (1852); H.-S., 417—18.	*Arm. m. or. Hyrcania.*
AGLAIA, *Linn.*, S. N., x., 481; Hb., 65, 66. *fortuna*, Jans., Cist. Ent., ii., p. 154 (1877).	*Territ.* (*excl. Maur. Canar, Syr. Hyrc. et Pers.*); *Japan; E. Tibet.*
var.? *vithatha*, Moore, P. Z. S., 1874, p. 568; de Nicé., Butt. Ind., ii., p. 136 (minor; dilutior; pallidior; forma alpina).	*Skorolah, Ladak,* 15,000 *ped. alt.* (*Leech*); *Gilgit* (*Biddulph*).
NIOBE, *Linn.*, S. N., x., 481, xii., 786; Hb., 65, 66.	*Eur.; Asia occ. et centr.*
ab. *eris*, Meig., i., p. 64, t. 14, 5, 6; *niobe*, Hb., 61, 62 (subt. punctis argenteis paucis vel nullis; forma frequentior).	
var. *orientalis*, Alph., Lep. Kuldja, p. 77 (pallidior; minus nigro punctata, ? constans).	*Asia centr.* (*Kuldja*).
var. *gigantea*, Stgr., Cat., 1870, p. 21; *niobe*, Led., Hor., 1869, 82 (var. maxima, ♂ satur. fulvus, ♀ virescens).	*Hyrcania.*
JAINADEVA, *Moore*, Ent. Mo. Mag., i., p. 131 (1864); P. Z. S., 1865, t. xxx., 1; de Nicé., Butt. Ind., ii., 135.	*N.W. Himalaya; Ladak,* 7—12,000 *ped. alt.*
NERIPPE, *Feld.*, Wien. Ent. Mon., vi., p. 24 (1862); Leech, P. Z. S., 1887, p. 423. *A. coreana*, Butl., Ann. Nat. Hist., 1882, ser. v., ix., p. 15. *A. adippe* var. *nerippe*, Elwes, P. Z. S., 1881, p. 901.	*Japan; Korea; China c.* (*Pratt*).
ADIPPE, *Linn.*, S. N., xii., 786 (1766); Esp., 18, 1, etc. *A. pallescens*, Butl., Cist. Ent., i., p. 164. *A. vorax*, Butl., Trans. Ent. Soc. Lond., 1871, p. 403; Lep. Ex., t. 54. *A. locuples*, Butl., Ann. Mag. Nat. Hist., ser. v., vol. 7, p. 134; *cf.* Leech, P. Z. S., 1887, p. 423; Graeser, Berl. Ent. Zeit., 1888, p. 94.	*Eur.* (*excl. reg. pol.*); *Asia occ. et or. Japan; Korea; China centr.*
ab. *cleodoxa*, Ochs., iv. p. 118; *adippe*, Esp., 26, 4.	

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ab. *cleodippe*, Stgr., Cat., 1870, p. 21. var. *chlorodippe*, H.-S., vi., p. 5; *adippe*, Ramb., Faun. And., p. 279. var. *taurica*, Stgr. MSS. ab. *xanthodippe*, Fixsen, Rom. Mem., iii., p. 307 (varietates inconstantes, cum multis formis intermediis, nomina vix conservanda).	
LAODICE, *Pall.*, Reise, i., 470 (1771); Esp., 93, 1; Künow, Schr. Ges. Königsb., 1872, p. 447, t. vii.* var. *japonica*, Men., Cat., p. 102, t. x., 3 (1857), (inconstans, nom. haud conservandum).	*Germ. s. or.; Ross.; Taurus; Arm.; Lenkoran; Amur; Japan; China sept. et centr.; Tibet or.*
RUDRA, *Moore*, Cat. E. I. C., i., p. 157 (1857); de Nicé., Butt. Ind., ii., p. 132, t. xviii., fig. 75, ♂.	*Montes Khasia (Ind. or.), 4—5000 ped. alt.; Burmah sup. (montibus).*
LYSIPPE, *Janson*, Cist. Ent., ii., 1877, p. 154. ? *ruslana*, Motsch., Bull. Mosc., 1866, ii., p. 117. *A. ruslana*, Elwes, P. Z. S., 1881, p. 902; Leech, P. Z. S., 1887, p. 424; Pryer, Cat. Lep. Japan (in Trans. As. Soc. Jap.), 1883, p. 235.	*Amur; Askold; Japan.*
ANADYOMENE, *Feld.*, Wien. Ent. Mon., vi., p. 25 (1862). *A. ella*, Brem., Lep. Ost. Sib., p. 94, t. 8, 1 (1864).	*Amur; Askold; Japan; China centr.; Ningpo.*
PAPHIA, *Linn.*, S. N., x., 481; Esp., 17, 1, 2; Buckl., Ent. Mo. Mag., xiv., p. 252—6 (1877).* *A. paphioides*, Butl., Ann. Nat. Hist., ser. v., vol. 7, p. 184. ab.? et var. ♀ *valesina*, Esp., 107, 1, 2 (supra virescens, formæ intermediæ adsunt, et in Asia or. typicæ sunt).	*Eur. (excl. reg. bor.); Asia occ. et or.; Japan; China sept. et cent.*
PANDORA, *Schiff.*, S. V., p. 176 (1776); Esp., 58, 1, 2. *maja*, Cram., i., xxv., B, C (1776?).	*Eur. m.; Maur.; Canar; Asia occ. et centr.; Gilgit.*
KAMALA, *Moore*, Cat. E. I. C., p. 156 (1857); de Nicé., Butt. Ind., ii., p. 134. *A. cnidia*, Feld., Reise Nov., iii., p. 392, t. 50, 5, 6, ♀ (1867).	*Him. bor. occ. 6000—10,000 ped. alt.*
CHILDRENI, *Gray*, Zool. Misc., i., p. 33 (1831); Ins. Nepal, t. xi., ♂ (1846). *A. sakontala*, Koll., Hügel's Kash., iv., p. 439, t. xii., ♂ ♀ (1848).	*Him. 6—10,000 ped. alt.; Montes Khasia et Burmah sup.; China centr.*

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SAGANA, *Dbld. Hew.*, Gen., t. 24, i. ♂ (1849). *Damora paulina*, Nordm., Bull. Mosc., 1851, ii., p. 440, t. 12, 1, 2, ♀.	*Sib. or. Amur; Korea; Japan; China sept. et cent.*
NIPHE, *Linn.*, S. N., 1, 2, p. 785 (1767); Cram., t. 14, B. E. *Acidalia niphe*, Moore, Lep. Ceyl., i.. p. 60, t. 31, 2, *a*, *b**.	*Regio Ind.; China mer.; Japan.*
var. *inconstans*, Butl., Cist. Ent., i., p. 164 (1873), (minor, pallidior, ♀ al. ant. albis non fasciatis).	*Java; Australia sept. (Moreton Bay, etc.)*
IDALIA, *Drury*, i., t. 13 (1775); Cram., t. 44, D, G (1779); Edw., Can. Ent., 1879, p. 217*. *Speyeria idalia*, Scudd., Butt. New Eng., p. 535, t. 4, 3, 8, t. 12, 12 (1889).	*U.S. Am.; Maine ad Nebr. et Arks.*
DIANA, *Cram.*, ii., t. 98, D, E (1775), ♂; Feld., Reise Nov., t. 50, 3, 4, ♀ (1867); Edw., Butt. N. A., i., 63, t. 20, 1868., Arg., t. 7, *a—h**; id., Can. Ent., 6, 121, 1874*.	*U.S. Am.; Alleghany Mts.; Ohio; Ill.; Arks.*
CYBELE, *Fabr.*, Syst. Ent., 516 (1775); Edw., Butt. N. A., i., 67, t. 21 (1868); id., Can. Ent., 6, 121 (1874).*	*U.S. Am. or. et centr.; Can. N.W. Terr.*
? *carpenterii*, Edw., Tr. A. E. Soc., v., p. 204 (1876), (mihi nat. ignota).	*New Mexico.*
A. cybele var. *carpenterii*, Edw., Butt. N. A., iii., pt. 8 (1889).*	
LETO, *Behr.*, Pr. Cal. Acad., 2, 173 (1862); Edw., Butt. N. A., i., 85, t. 29 (1869). *cybele*, Bdv., Lep. Cal., 60 (1869). *cybele* var., Streck., Cat., p. 111 (rectius bona species). *A. nokomis* ab., Streck., Ruffn. Rep., p. 1864 (1878), ♀? (♀ al. sup. et inf. ad basin obscurioribus; supr. marg. lutescente; non cinnamomeo).	*U.S. Am.; Cal. ad Wash. Terr.; Fort Macleod, N.W.T. (fide Geddes); ? Col.*
NOKOMIS, *Edw.*, Pr. Ac. Phil., 1862, 221; Butt. N. A., i., 73, t. 23 (1868); Mead, Wheel. Rep., p. 757, t. xxxv., 1—4 (1875), ♂ ♀.	*U.S. Am.; Ariz.; Utah.*
var. *nitocris*, Edw., Tr. A. E. Soc. v., 15 (1874); Can. Ent., 1879, p. 82; Mead, Wheel. Rep., p. 751, ♂; Edw., Butt. N. A., iii., Arg. 1 (subt. al. post. ad basin cinnamomeis; trans. ad *leto*).	*Aris.; Nevada; Col.*
APHRODITE, *Fabr.*, Mant., 2, 62 (1767); Edw., Butt. N. A., i., 71, t. 22 (1868); id., Can. Ent., 6, 121 (1874).*	*U.S. Am. (excl. mer. et. occ. Canada; N.W. Terr.; Col.; Wyoming.*
? var. *halcyone*, Edw., Butt. N. A., i., 83, t. 28 (1869), ♂ (al. ant. magis elongatis ?).	
? var. *alcestis*, Edw., Tr. A. E. Soc., v., 289 (1876); Can. Ent., 12, 69 (1880).*	*Mich.; Ill.; Nebr.; Mont.; Col.*

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cypris, Edw., Can. Ent., 1886, p. 62 (var. vel forma inconstans occidentalis; et trans. ad *aphrodite;* paullo major, rubidior, vix distinguenda).	
var. vel ? bona sp. *nausicaa*, Edw., Tr. A. E. Soc., v., 104 (1874); id., *Papilio*, 3, 6 (1883); id., Butt. N. A., iii., Arg., x.	*Arizona.*
? *aphrodite*, Mead, Wheel. Rep., p. 752 (forma *Arizonensis* rubidior; al. post. subt. mac. arg. minoribus; ♂ al. post. ciliis subcostalibus minus elongatis).	
LAIS, *Edw.*, Can. Ent., 15, 209, 1883; Geddes, Can. Ent., 19, p. 230 (*atlantis* var. ? minor, pallidior).	*N.W. Terr.; Fort Edmonton* (*Geddes*).
ATLANTIS, *Edw.*, Pr. Ac. Phil., 1862, 54; Butt. N. A., i., 75, t. 24 (1868); Can. Ent., 9, 85 (1877)*; Scudd., Butt. N. E.. p. 571, t. 4, 6, etc.	*U.S. Am. bor.; Lab. Newf.; Canada, N. W. Terr. ad. circa* 60° *N.*
var. *electa*, Edw., Field and Forest, 8, 143 (1878).	*Col.; New Mexico; Montana.*
atlantis, Mead, Wheel. Rep., p. 754 (al. post. subt. mac. arg. paucis; ? trans. ad *hesperis*).	
hesperis, Edw., Pr. E. S. Phil., 2, 502 (1864); id., Butt. N. A., i., 79, t. 26 (1874); Mead, Wheel. Rep., 754 (1875)	*Col.; Utah; Montana.*
? var. vel transitus ad *zerene*.	
? *columbia*, H. Edw., Pr. Cal. Acad., 6 (1877).	*Brit. Columb. sept.* (*Crotch*).
CORONIS, *Behr.*, Pr. Cal. Acad., 2, 173, 1862, No. 2; Edw., Pr. E. Soc. Phil., iii., 435 (1864); Butt. N. A., iii., Arg., iv.	*Californ. to Wash. Terr.; N.W. Terr.* (*Geddes*).
♀, *nevadensis*, Edw., Butt. N. A., i., t. 33 (1871).	*Nev.; Mont.; Utah.*
juba, Bdl., Lep. Cal., p. 60 (1869).	
? *macaria*, Edw., Field and Forest, 3, 86 (1877).	*Nevada.*
? *chitone*, Edw., Can. Ent., 11, 82 (1879).	*Nevad.; Cal.; Utah.*
var. *semiramis*, Edw., Can. Ent., 18, 61 1886), (forma meridionalis et deserticola; supra dilutior, minus nigro notata).	*San Bernardino Co., Cal.*
var. vel trans. ad *calippe; liliana*, H. Edw., Pr. Cal. Acad., 6, 1876; Edw., Butt. N. A., iii., Arg., t. iii.	*Napa Co., Cal.; Utah.*
laura, Edw., Can. Ent., 11, 49 (1879).	*Nevada.*
CALLIPPE, *Bdv.*, Ann. Ent. Soc. Fr., 2, x., 302 (1852); Edw., Butt. N. A., i., 77, t. 25 (1868).	*California.*
? var. vel trans. ad *edwardsii*, vel ad *zerene*, *inornata*, Edw., Trans. Am. Ent. Soc., iv., p. 64 (1872); Butt. N. A., ii., Arg., t. v. (1876).	*Cal.; Nevada.*

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EDWARDSII, *Reak*, Pr. E. Soc. Phil., vi., 137 (1866); Edw., Butt. N. A., i., 87, t. 30 (1869); *cf.* Mead, Wheel. Rep., p. 754.	*Cal.; Mont.; Utah.*
var. vel bona sp. *nevadensis*, Edw., ♂, Tr. A. E. Soc., iii., 14 (1870); Butt. N. A., i., 93, t. 33 (1871), ♂ non ♀ (? forma minor; ♀ supra pallidior, subt. virescens, ? transitus ad *meadii*).	*Nev.; Mont.; Utah.*
var. vel bona sp. *meadii*, Edw., Tr. A. Ent Soc., v., 69 (1872); Butt. N. A., ii., Arg., t. ii. (1875).	*Cal.; Mont.*
nevadensis var. *meadii*, Edw., Cat., 1884, p. 28.	
MONTICOLA, *Behr.*, Pr. Cal. Acad., ii., p. 175, No. 8 (1862); Edw., Butt. N. A., i., 81, t. 27 (1868).	*California; Oregon; Wash. Terr.; Brit. Col.; N.W. Terr. (Geddes); Nevada; Montana (fide Edw).*
? var. *purpurascens*, H. Edw., Pr. Cal. Acad., 6 (1876), (minor supra obscurior, nom. vix conservandum).	
? var. *behrensi*, Edw., Tr. A. E. Soc., ii., 370 (1869); Butt. N. A., i., 89, t. 31 (1870), (? trans. ad *monticola* vel ad *bremneri*, nomen vix conservandum).	*Mendocino Co. Cal.*
BREMNERI, *Edw.*, Tr. A. E. Soc., iv., 63 (1872); Butt. N. A., ii., Arg., t. 4 (1874).	*Wash. Terr.; Brit. Col.; Vancouver's Isl.; ? Cal.*
hippolyta, Edw., Can. Ent., 11, 81 (1879).	*Oregon; Cal. sept.*
? var. *rhodope*, Edw., Tr. A. E. Soc., v., 13 (1874); Butt. N. A., ii., Arg., t. 6 (1874), (minor, ? inconstans; nom. vix conservandum).	
ZERENE, *Bdl.*, Ann. Soc. Ent. Fr., 1852, p. 302 (in parte); Behr., Pr. Cal. Acad., ii., 175, No. 9 (1862).	*California; Shasta, Plumas Co., etc.; Nev.; Utah (fide Edw.)*
? *hydaspe*, Bdl., Lep. Cal., 60, 1869; Edw., Butt. N. A., i., 91, t. 32 (1870), as *zerene*.	
? *irene*, Bdv., Lep. Cal., p. 59 (1869); Edw., Can. Ent., 1879, p. 53.	
zerene var. *irene*, Streck., Cat., p. 113.	
? *rupestris*, Behr., Pr. Cal. Acad., ii., 175 (1862), No. 6; Edw., Butt. N. A., ii., Arg., 7 (1876).	
egleis var. *irene*, Bdv., Lep. Cal., 59 (1869), *fide* Edw.	
(formæ inconstantes minores quam *monticola*; nomina incerte identificanda; vix conservanda).	
var. ? *adiante*, Bdl., Lep. Cal., 61 (1869); Behr., Pr. Cal. Acad,, ii., 175 (1862), No. 7.	*Sta. Clara Mts.; California.*
adiaste, Edw., Pr. E. Soc. Phil., iii., 436 (1864), (*zerene* proxima; supra et subt. dilutior, al. post. subt. inconspicue notatis).	

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EURYNOME, *Edw.*, Tr. A. E. Soc., iv., 66 (1872); Butt. N.A., ii., Arg., t. i. (1875)*; Mead, Rep. Wheel. Exp., v., 755 (1875).	*Col.; Mont.; N.W. Terr.; ? Brit. Col.*
astarte, Edw. (nec. Doubl.), Pr. E. Soc. Phil., i., 221 (1862).	
clio, Edw., *l. c.*, 106; Geddes, Can. Ent., 19, 232.	*N.W. Terr.; Brit. Col.*
artonis, Edw., *l. c.*, 9, 2 (1881), (minor subt. mac. arg. nullis vel paucis).	*Col.; Nev.*
? *bischoffii*, Edw., Tr. A. E. Soc., 3, 189 (1870); Butt. N. A., ii., Arg., t. iii. (1875), (var. vel? bona sp.; obscurior, subt. mac. albidis).	*Sitka; Alaska.*
var. *opis*, Edw., *l. c.*, 5, 105 (1874); Butt., ii., Arg., t. iii. (1875).	*Brit. Col.*
var. vel transitus ad *montivaga*.	*Wash. Terr.; Col.; Cal.*
arge, Streck., Cat., 114 (1878).	
erinna, Edw., Can. Ent., xv., 33 (1883); Geddes, Can. Ent. xix., 232 (1887).	*N.W. Terr.; Brit. Col.*
var. ? vel bona sp. *montivaga*, Behr., Proc. Cal. Ac., 2, 174, "No. 4" (1862), id., *l. c.*, 3, 84 (1863); Edw., Can. Ent., xi., p. 52 (1879).	*Sierra Nevada; Cal.; Nev.*
A. sereue var. *montivago*, Streck., Cat., p. 114 (al. ant. paullo magis elongatis; subt. minus viride tinctis).	
? var. *egleis*, Bdv., Lep. Cal., 59 (1869), *fide* Edw.; Edw., Butt. N. A., iii., Arg., t. ix.*	*Sierra Nevada; Cal.; Utah; Col.; Nevada.*
montivaga, Edw. (non Behr.), Proc. E. Soc. Phil.. iii., 435 (1864).	
♀ *mormonia*, Bdv., Lep. Cal., 58 (1869), (subt. mac. arg. subnullis; nomen vix conservandum).	

A. aphirape, like almost all wide-ranging species, varies very much, but the varieties are inconstant. The Labrador form, which Staudinger, as I think wrongly, refers to *triclaris*, though paler above, and in the female sex, than typical Lapland specimens, is more like them than those from Nikolaievsk and Colorado, which are paler, and nearer to the German and Armenian form. One from Hudson Bay is like those from Esthonia and St. Petersburg, intermediate between the type and *ossianus* in size and colour, but marked beneath like *ossianus*. The American form seems rare and confined to great elevations in the Rocky Mountains, but will probably be found at many points in Arctic America.

A. hegemone is considered by Staudinger and Alpheraky as nearest to *euphrosyne*, of which the former says it

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may be a form, but the markings of the under side seem to me to show its nearer affinity with *aphirape*. Alpheraky says that Kuldja specimens differ constantly from those from Margilan, but the difference in my specimens is very slight.

A. selene seems to vary less than most of the species, but its aberrations are numerous, and some are named and figured by Spangberg. The arctic var. *hela* in typical specimens may be separated, but I think is hardly deserving of a name.

A. oscarus, as figured by Eversmann, is a sufficiently distinct species, though my specimens are not so bright in colour as his. He compares it with *ossianus*, as Fixsen does with *euphrosyne*, but it seems to me nearer to *selene* than to either, though it may be distinguished from both by the larger size, and by the absence of any silvery spots on the middle band of the hind wing below. I have not seen enough of the variety *australis* to say whether the difference is marked and constant, but Graeser says it has the same relation to the type as *aphirape* and *euphrosyne* have to *ossianus* and *fingal*, and that the difference is much greater.

A. perryi, Butl., from Possiet Bay, of which I have seen the typical specimens, appears to be the same as *iphigeneia*, but the identification is not certain.

A. iphigeneia is a species of which I know but little. I have a single not very fresh specimen from Amurland which agrees with Graeser's specimens and description exactly, and three others from Gensan in Korea, collected by Mr. Leech, which agree with it in the shape of the wings, but on the under side show more of the markings of *selene*. Graeser says it is near *oscarus* and *euphrosyne*, but differs from both in the longer narrower wings, and in the colour and pattern of the under side of the hind wing. I cannot consider it as a variety of either of these species, and, without seeing a long series of both sexes, am not able to say that it is distinct, though before Graeser had described it, I had separated my specimen as one which I could not identify with certainty.

A. euphrosyne, var. *fingal*, is a boreal form which in Lapland, Jemtland, Finland, and other parts of Northern Europe, and perhaps Asia, appears pretty constant; but the form found at Bodo in Arctic Norway is *euphrosyne*,

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and occasional examples of *fingal* occur in the Alps (I have one from Tarasp).

A. myrina, though a very near ally of *selene*, next to which, perhaps, it should be placed, is sufficiently distinct and constant to be recognised. It seems to have a very wide range in the colder but not in the arctic parts of North America, but is somewhat local.

A. altissima, *gemmata*, and *clara* are three allied, but very distinct and beautiful species, which seem best placed here; they are all confined to the alpine regions of the Himalaya. The exact habitat of *A. clara* was long doubtful, but it has lately been found by Mr. Duthie and others at Gangootri, near the source of the Ganges, and at Phuladaru, in the province of Gurwhal. *A. gemmata* occurs somewhere in the same country, as well as in alpine Sikkim, where it seems very abundant.

A. jerdoni and *A. gong* are also allied species, though easily distinguished from each other by the markings of their under side. One inhabits the western, the other the extreme eastern edge of the great Asiatic highlands, and both as yet are known from one locality only, though their range is probably not so restricted as it seems.

A. pales.—The varieties of this species are so endless that it seems almost impossible to retain names for any of them except the form known as *arsilache*, which occurs in the peat-bogs of Northern Germany, and in Northern Europe and Asia; and which by some good entomologists, among whom Zeller and Meyer-Dur are prominent, is considered as a distinct species. After studying very carefully and repeatedly my own collection, containing 74 males and 56 females, in which all the known forms except the Greek one are very fully represented, and seeing thousands of specimens in other collections, I do not see how any of the named forms can be defined with certainty, and though typical specimens from the Caucasus and Central Asia could be recognised as local variations, they are nowhere constant to one type. The most distinct are those from some parts of Central Asia (var. *generator*, Stgr.), especially from South-western Altai, and the Skorolah in Western Ladak, some of which have the spots on the upper surface almost obsolete, and the under side very peculiar. Those from the Caucasus (var. *caucasica*, Stgr.) are very bright in colour above, and much spotted below,

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closely resembling the average Pyrenean specimens, and below intermediate between *pales* and *arsilache*. Those from Greece (var. *græca*, Stgr.) are described as paler below and with the fringes variegated, but this is also the case in some alpine and Himalayan specimens. The majority of these last, however, which have been named *sipora* and *baralacha* by Moore, are much nearer to Swiss than they are to Central Asiatic ones, and certainly cannot be separated.

Staudinger considers *arsilache* as a var. only of *pales*, saying that the Scandinavian form, which he names *lapponica*, is intermediate; but Zeller says that his evidence, *cf.* Stett. Ent. Zeit., 1861, p. 347, and 1872, p. 44, tells as much in favour of their distinction as of their identity. Meyer-Dur also, in his excellent work on the Swiss butterflies, strongly supports the idea that they are different, but Frey, who had probably a larger material and experience, agrees with Staudinger. *A. pales*, however, is everywhere the typical mountain form, and *arsilache* the lowland one: out of fourteen pairs from Denmark, Sweden, Norway, and North Russia, all but four are nearer to *arsilache*, those from the Dovrefeild being the only exceptions.

Considering, therefore, that in Europe we can usually distinguish the two forms by their markings, and the difference in their habitat, and that their larvæ have probably different food-plants, it will only be a question of individual opinion whether they are distinct species. It is curious that *pales*, which is found over such a wide area, and is common wherever it occurs, should be absent, and have no near ally in N. America.

A. chariclea is a circumpolar species, but hitherto found only in isolated localities in Lapland and Siberia, whilst in Labrador, British America, and Greenland it is more generally distributed. It varies considerably, and in the extreme north is much darker in colour above (var. *obscurata*, M'Lachl.); whilst in the Rocky Mountains, and occasionally in Labrador, it assumes the form *boisduvalii*, which Edwards treats as distinct. I cannot, however, see any good reason for this, as there is no possible line of division between the two; and Geddes found both flying together at a high altitude in the Rocky Mountains. It extends to a higher latitude than any other butterfly, except *A. polaris*.

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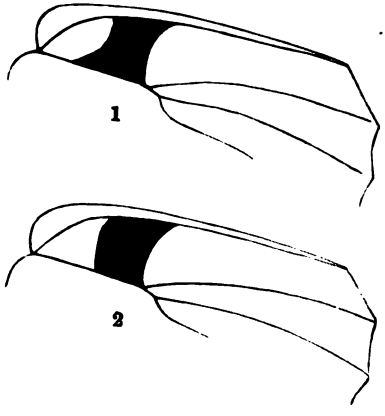
A. montinus is certainly a form of *chariclea*, which has remained isolated on the White Mountains for so long that it has assumed a distinctive character, and may be considered as a good instance of a fixed local race. The Rocky Mountain form of *chariclea*, which exists under very similar conditions, seems the nearest to it, but I have seen none which could possibly be mistaken for *montinus*.

A. helena is probably another representative which extends far south on the higher parts of the Rocky Mountains. In Montana I took it at 6500 ft. In Colorado it ascends to 13,500 ft. It is not unlike *selenis*, but may be distinguished by the lighter shade of coloration, and less heavy spotting above, and by the shape of the large patch nearest the costa on the band of the hind wing below, which in eleven specimens had the



1. *A. helena:* costa of hind wing below. 2. *A. selenis:* costal patch of hind wing below.*

shape shown in the annexed cut, whilst one only was straight on the inside, as was the case more or less in eleven specimens of *selenis* (see cut), of which ten were from Siberia.

A. selenis occurs in the Ural Mountains, and in various parts of Central and Eastern Siberia to the Lower Amur. The eastern form is rather larger and darker in colour, and has been separated by Erschoff as var. *sibirica*, but I have not seen sufficient specimens from the Ural to say

* The dark patch in the cut is really pale yellowish, and rather exaggerates the difference between the species, being made from a rough sketch of my own, and not from the actual specimens.

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whether this difference is constant. I agree with Graeser in thinking that it is better placed near *chariclea* and *freija* than before *selene*, where Staudinger arranges it.

A. angarensis is very close to *selenis* var. *sibirica*, and perhaps can only certainly be distinguished in the male sex by the row of silvery white marks on the border of the hind wing below. The female, however, of which sex I have four perfect specimens, seems paler in colour and rather larger than the corresponding sex of *selenis*. Graeser, who has taken both in abundance, does not question their distinctness.

A. freija is a species of immensely wide range, but which does not seem to vary in the least, six pairs taken by me in the Yellowstone Park being indistinguishable from average Lapland and Swedish specimens. Its range, however, differs much in the Old and New Worlds, for whereas in Europe it is not found south of 58° or 59° N. in Estland, and 60° in Sweden, and extends to about 70° N. in Lapland and Siberia; in the Rocky Mountains it extends south to at least 40° in Colorado, and is not known to occur farther north than Fort Simpson, about 62° N. The difference in climate and vegetation of the two continents at similar latitudes must explain this, and only the presence of the continuous high range of the Rocky Mountains can account for its extending so far to the south in Colorado. The form described as *tarquinius* is, I think, only a smaller darker arctic var., which occurs also in British Columbia.

A. amathusia.—A well-known and little-varying species, as far as my experience goes; but I possess no eastern or Asiatic specimens. Russian specimens, however, are paler and somewhat smaller than Swiss ones, as are some from the Italian valleys of the Western Alps. Schilde, in his paper on Finland butterflies, Stett. Ent. Zeit., 1873, p. 176, says that *freija*, *chariclea*, and *amathusia* hold as near a relationship to each other as *aphirape*, *ossianus*, and *triclaris*, and that he finds only trifling differences between the two latter; but I cannot at all agree with this, as *amathusia* is fully as distinct and more easy to separate, than many species in this group; and if it was, as he seems to suggest, the alpine representative of either *chariclea* or *freija*, would probably have retained its place only in the highest and coldest part of the Alps, whereas it flies in grassy glades among

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bushes at 3—4000 ft.; and though I have taken it as high as 6000 ft. in the French Alps, its range is usually much lower; Meyer-Dur says not above 4500 ft.

A. frigga is another circumpolar species of very similar distribution to the last, and varying much in size and markings of the under side below. Labrador specimens, as well as the few I have seen from Colorado and Hudson Bay, may usually be distinguished by the whitish or yellowish markings of the hind wing below (except the patch nearest the costa, which even in the form *improba* remains whitish) being partially or completely obscured by the reddish brown of the ground colour. *Improba* is an extreme arctic form, which, strange to say, exists in as widely remote localities as Nova Zembla and Arctic America, and shows, in its small size and dark colour, the same influences of a cold and bad climate, as is shown by other arctic Lepidoptera, but the markings and pattern are so nearly identical with those of *frigga* that hardly anyone but Mr. Butler could have described this highly interesting form without alluding to the existence of what even he must allow is an extremely near ally.

A. dia is a species which varies little, and is too well known to require much remark.

*A. bellona** is an American species, which occurs frequently in many parts of the Northern United States and British America east of the Rocky Mountains, and extends to British Columbia, whence there is a specimen in the British Museum: *epithore* replaces it in most places on the Pacific coast, and is by Edwards considered distinct, though I incline to Strecker's view that it is only a variety. It may generally be recognised by the paler colour, less heavily marked with black at the base of the wings, and the rather less produced apex and less angled outer margin of the fore wings. I have not seen the variety named *kreimhild* by Strecker, which appears to be found in the dryer parts of the Rocky Mountains from Utah to Arizona. From the discription it would seem to be a local race of *epithore*, as Edwards thinks.

A. thore is a distinct species, rare and somewhat local

* Mead says that "the larva of *bellona* resembles more closely that of *cybele* than that of *myrina*," thus affording additional evidence of the artificial character of the genus *Brenthis*, erected to contain these smaller Argynnides. He includes both *bellona* and *epithore* in his list from Colorado.

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in the Alps, where it occurs at 3—6000 ft., and, as far as I have seen, in shaded valleys on the edge of pine and larch woods, where it settles on the flowers of the rhododendron. In Jemtland, and on the Dovrefeild, a form occurs which is intermediate between the dark alpine and the pale Lapland and eastern variety *borealis*.

A. amphilochus is a very distinct species, which seems to have no near allies in Europe or Asia, and is, as far as yet known, confined to a limited district near the watershed of the Upper Amur.

A. astarte is an almost unknown species, which was discovered in some part of British Columbia (perhaps on the Cascade Mountains) many years ago, by some of Lord Derby's collectors. The type is in the British Museum, and seems to have been overlooked both in Strecker's and Edwards' catalogues, probably because the locality is incorrectly given in Kirby's catalogue as Jamaica. It has never been since found by any entomologist, and seems to me a species quite distinct from any other in North America, and most nearly allied to *amphilochus*.

A. ino varies little except in size, and I should not have said that the var. *amurensis* is a well-marked form; but as both Staudinger and Graeser, who have seen it in hundreds, say that independently of its usually, but not always much greater size, it can be recognised by the different colour of the under side of the hind wing, I retain the varietal name against my own opinion, which is based on the examination of a much smaller number of specimens. Excepting by de l'Orza, *ino* has not been recorded from Japan, but there are three specimens in Mr. Godman's collection, taken by Jonas at 5000 ft., which are certainly nothing else; and Mr. Leech has also three specimens from Oiwake, Japan, taken by Pryer.

A. daphne is another species of very wide range, which does not vary much except in its extreme eastern range, and there in very much the same way as the last. I am not at all sure that the Japanese and Amur form can be constantly recognised, as I have not a long series of either, but those I have from Japan, Amurland, and Korea, all agree in being somewhat larger, the outer margin of the fore wing a trifle less rounded, and the under side of the hind wing somewhat greyer and less violet than the average of European specimens.

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A. hecate is a species of somewhat limited range in Europe, but occurs in Western and Central Asia, and seems to vary little. Staudinger's var. *caucasica* is not recognised in the Grand Duke Romanoff's list of Caucasian butterflies, and those specimens I have from Amasia and Armenia agree perfectly with Hungarian examples; so I think this name may be dropped.

A. lathonia.—A re-examination of my long series of this species has lead me to modify the opinion I formerly held that the Himalayan form was not to be distinguished from the European. Unfortunately I am unable to compare a series of specimens from Central Asia, where, according to Alpheraky, it is rare, and I therefore cannot say to which form those belong. Alpheraky only says "perhaps a little paler than European specimens." The Himalayan form, however, can be distinguished by the silver patches in the cell of the hind wing below, being lanceolate or rather pointed towards the outside, and angled towards the costa instead of oblong, as in European specimens. This character fails partially to distinguish about four of my forty specimens. A more constant and better distinction is the form of the silver patch at the abdominal angle, which extends in the Himalayan examples in a band of diminishing breadth, almost to the end of the lanceolate patch above mentioned, where, as in the European specimens, it never extends beyond the first median nervule (vein 1, apud H.-S.). As a rule also, the Himalayan specimens are larger and rather paler in tint on the upper side. The species has not yet been found anywhere in Eastern Asia, China, or Japan, but is common in Sikkim and the North-west Himalaya. It does not seem that the name *isæea*, which was attributed to Doubleday by Gray, was ever used by him in print, and I think no description of it has been published. De Nicéville, relying on myself, uses the name *lathonia* for the Himalayan variety.

The synonymy of the Chilian species of *Argynnis* is somewhat involved.* Butler and Reed do not agree in

* Berg, in the 'Annals of the Argentine Society' for 1882, gives a full synonymy, which he says is based on an examination of the typical specimens of *dexamene* and *lathonioides*, and is, perhaps, more correct than mine, which was written before I had been able to get access to this paper.

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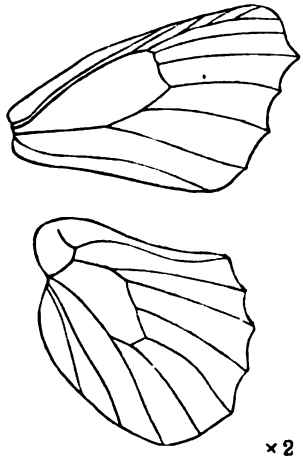
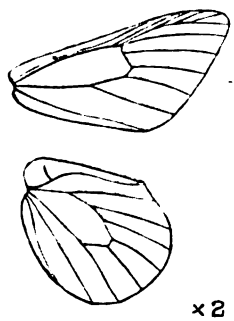
their identification of Blanchard's species. Butler says that *siga* of Hübner is the northern variety of *cytheris*,



A. cytheris: to show venation and shape of wings.

the type, which came from the Straits of Magellan. But I find specimens from Conception in Mr. Godman's collection as small as others from Puntas Arenas in the Straits, and do not think the variety is constant. Butler makes *anna* a synonym of *cytheris*, but Reed, as I think rightly, makes it the male of *lathonioides*, and says that it is



A. modesta: to show venation and shape of wings.

found from the Straits of Magellan as far north as the Desert of Atacama. Edmonds found it as high as

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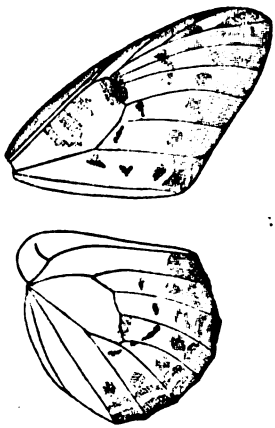
6000 ft. in the Cordillera. The sexes in this species are much more alike than in *cytheris*, and resemble the female of the latter in colour, but may, I think, be distinguished by the shape of the wings.

A. modesta is a small species confined to the higher mountains, and quite distinct on the under side from the other two.

The species which I have named *A. hanningtoni* is one of the most remarkable of the whole genus, both on account of its locality, which is widely separated from that of any other *Argynnis*, and on account of its peculiar



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A. hanningtoni.

appearance, but I can see nothing in its venation, which I have here figured, or in its structure to separate it from the genus. The types are three males, taken in the forests of Taveta, near Mount Kilimanjaro, in Africa, by the late Bishop Hannington in March, 1885, and are in the collection of the British Museum.

A. hanningtoni, n. sp.—♂. Above, dull fawn-colour, with the base and border of wings blackish, near the margin a line of white spots, and inside them a line of black spots on both wings. Some more black spots in the interspaces and cell. Below, with no black border or base, one basal spot, a line of transverse spots, and marginal lunules dull silvery, all surrounded by reddish brown.

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A. elisa is a well-marked species peculiar to the mountains of Corsica and Sardinia, and is, as far as I know, the only instance of such an insular development in the genus.

A. aglaia has perhaps the widest range of any species of the genus. It varies chiefly in size, from an average of about 1·6 in. on the Dovrefeild, in Norway, to about 2·4 in. in Amurland. The females in England are sometimes very dark in colour; in hot climates, such as Southern Spain and Amurland, they are paler and greener towards the base of the wings than in ordinary European specimens. In Japan the species seems rare or local, and the only female I have is somewhat darker green on the hind wings below. In Kuldja Alpheraky says it is rare, and ascends to 10,000 ft. At Ta-Tsien-lo, in East Tibet, it seems common, but, as far as we know, it does not extend to Central China. A form has been taken in the extreme north-west of Kashmir and Ladak, *vithatha*, Moore, by Capt. Hellard and Mr. Leech, which may be considered as a good local variety, though I have not seen enough specimens to say so with certainty. It flies on the Skorolah as high as 15,000 ft. elevation, and may be recognised by its pale colour, and in the male is much less heavily marked with black than any other *aglaia* I have seen, resembling *niobe*, var. *orientalis*, very closely. The females also, on account of the pale markings of the apex and outer marking of the fore wings, resemble *niobe* more than *aglaia*, so that I had confused it with the Ladak form of *jainadeva*, which was first sent me by Mr. de Nicéville as *vithatha*. But the under side is that of a true *aglaia*, and leaves little doubt of the position of this insect.

A. nerippe is allied to *niobe*, and is perhaps an extreme eastern development of this species; but it is so much larger, differently marked below, and constant to its type that I was clearly mistaken in putting it down as a variety of *adippe* in my list of the butterflies of Japan, being partly misled by a Korean specimen in which the median vein seemed somewhat dilated. Mr. Leech, who took large quantities in Korea, holds the opinion, in which I fully agree, that *coreana* is the same as *nerippe*, and a distinct species from either *niobe* or *adippe*. I have seen a specimen of *coreana* from Japan, taken by Jonas, in Mr. Godman's collection.

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A. niobe is a very wide-ranging species, which varies extremely on the under side, and has developed two or three varieties which are certainly well-marked, and, as far as I know, constant in Asia; but I have not seen enough of either *orientalis* or *gigantea* to speak with certainty of them.

A. jainadeva, however, the Himalayan form, may, I think, be regarded as a good species, which seems to me as near to *aglaia* as to *niobe*. It resembles *niobe* most on the upper side, especially in the female sex, but differs constantly on the under side in having the hind wing of a greenish tinge towards the base, as in *aglaia*, with the silver spots of the same, but with the addition of a row of three (sometimes four or five) rufous spots, of which two or three are pupilled with silver, between the outer and next row of silver patches. It never assumes the *eris* form of *niobe*, which seems commonest elsewhere, and out of thirteen males and nine females I have none which cannot be distinguished from *niobe*, of which I have forty from various localities. *Jainadeva* occurs in the north-western parts of the Himalayas only; and in the dryer climate of the northern valleys and Ladak assumes a form which is so close to the var. of *aglaia* found near the same region, that I had for a long time confounded them under the name of *vithatha*.

A. adippe is one of the most variable species; several forms have been included under varietal names by Staudinger, and others described by Butler, but none of them seems to me to be capable of exact definition, and none of them are confined to a particular region, so far as I know. In Japan, Korea, and Amurland all the named forms occur, and Leech says others quite as distinct are also found. As a rule, the eastern and southern specimens are larger, brighter, and the females often darker and more tinged with green, than the European ones. In all my forty male specimens the first median nerve of the fore wing appears strongly dilated for about one-third of its length, and in all but a few specimens from Amurland and Korea the second median vein also seems dilated to a less but usually well-marked extent.

The apparent dilatation of the median veins in several species of *Argynnis* is not, as Mr. Jenner Weir has pointed out to me, a fact. It is really due, as Mr.

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Scudder has well shown in his 'Butterflies of New England,' t. 44, fig. 4, to the presence of dark scales of unusual size, which conceal the so-called androconia ("federbuschschuppen," apud Aurivillius), which are long scales fringed at the end in the four species figured by Scudder on Plate 46. As these scales are not removed from the wing by Mr. Waterhouse's process of desquamation, I was lead to the belief that an actual thickening of the vein took place; but Mr. Weir has shown me entirely desquamated wings of *A. atlantis*, *paphia*, and *adippe*, which prove the correctness of his view. There is an admirable account of the formation and clothing of these veins, with figures of the scales and veins, in a paper by Herr C. Aurivillius, "über Sekundäre Geschlectscharaktare Nordischer Tagfalter," published in the 'Bihang till k. Svenska Vet. Akad. Handlingar,' Band 5, No. 25, Stockholm, 1880, P. A. Nordstedt and Sons, to which I must refer those who wish to study the question farther.

A. laodice is rather an eastern than a European species, but occurs throughout Russia from Sarepta and Odessa to about 60° N., and also in Eastern Germany, where in some seasons it is not very rare. In China and Japan, however, it is more abundant, and varies considerably in size and the tint of the under side. In this species the first median, and also the submedian, vein appear dilated in the males for about one-third of their length in both European and Asiatic specimens alike. The four specimens I have from Ta-tsien-lo, in East Tibet, which I owe to M. Oberthür's kindness, show in the rather broader and better marked transverse bar on the hind wing below, an approach to the next species, which their geographical position would lead one to expect, as it is evident that *A. rudra*, which is only a fixed local race of *laodice*, must have come to the Khasias through the hill-region of Upper Burmah, and the unknown country east of Assam, and not through the Himalaya, where it is unknown. Its existence here, surrounded by tropical plains on all sides but one, is somewhat remarkable. It is, however, in all the specimens I have seen and taken myself, easily recognised by the unvarying breadth of this band, as well as by the much greener colour of the hind wings below, to which also the Tibetan specimens show a tendency. The clothing of

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the veins in the male is not so well-marked in this species as in *laodice*.

A. lysippe is a perfectly good and distinct species, which seems rare both in Japan and Amurland. It has usually been known under the name of *ruslana*, Motsch., but, on referring to the description, I think that it cannot be applied to this insect. He says, "Statura, *arg. laodice* sed minor" (while Janson correctly says of *lysippe* larger). The rest of Motschulsky's description would do for any species of *Argynnis*, and there is not a word to indicate the characters by which it can easily be distinguished from *laodice*, namely, the different shape of the fore wings, shaped as in *A. anadyomene*, and the apparent dilatation of three instead of one of the veins. Another reason, which makes me think that Motschulsky had another species in view, is that he speaks of possessing "un bon nombre d'exemplaires," whilst *lysippe* seems to be always a rare insect in Amurland, as well as in Japan. Unless, therefore, the type of Motschulsky's species can be discovered, I think Janson's name must be adopted, as his description is a good and clear one. The females are larger and greenish in tint, shaped like the male, and having the same whitish spot near the apex of the fore wing, as the female of *A. laodice*.

A. anadyomene is allied to the last two species, but has a well-marked structural difference in one vein only, the first median, on which for fully half its length the scales are strongly raised and thickened. It seems common in China, and does not vary.

A. paphia, in the East of Asia, is as common as in Europe, and there increases in size, as do so many other butterflies. The females are in Japan and China seldom or never so yellow as in Europe, and the so-called aberration *valesina* is rather the type than the variety. In Europe also, in particular places and seasons, it is so common that it is rather an instance of dimorphism than of variation. What I consider a real aberration is the form known as *anargyra*, Stgr., in which the hind wings are without silver bands below; but such forms are hardly worthy of scientific names, for if once recognised they may be multiplied to any extent, and are rather a prize for collectors than of interest to scientific naturalists. *A. paphia* has the scales of all three

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median veins, as well as the submedian vein, thickened in the males, but only on the first median are they much raised.

A. pandora and *A. kamala* are species which require little notice, as neither of them vary appreciably. In both of them the first and second median veins seem dilated in the male.

A. childreni is the largest and most beautiful of all the Old World species. It extends from the North-west Himalayas as far east as Ichang, in Central China, and varies but little, specimens from the North-west Himalaya being somewhat smaller, paler, and the females greener in tint than those from the Eastern Himalaya, Khasia Hills, and China. It is found from 7 to 10,000 ft. in the North-west, but in the Khasias 4 to 6000 ft. is its zone of elevation. I have taken it on grassy places near woods, but not in forest-country. It has the first and second median veins in the male heavily scaled.

A. sagana is quite peculiar, on account of the remarkable difference between the two sexes, which lead to the female being first described under another name. It seems, however, to have close affinity with the last group, the first median vein being clothed in the same manner; while in some specimens the second and also the submedian seem thickened to a less extent. The species does not vary appreciably, as far as I have seen.

A. niphe is the only one of the whole genus, except *hanningtoni*, which has a tropical habitat. It also has the female very dissimilar to the male, and a style of marking below, not seen in any other *Argynnis*. But I can see no good reason for separating it generically, unless several other groups are also separated. The form found in Australia may be separated by its smaller size, duller colour, and the absence of the white bar in the female; it has been named *inconstans* by Butler. The Javan form resembles it in the male sex, but the female has the white band, and I have not seen specimens from any other of the Malay Islands.

The Argynnides of North America are, without exception, the most difficult butterflies to classify that I have ever studied. I have a collection which includes authentically named specimens of almost all the species and varieties, many of them direct from such well-known collectors as Messrs. H. Edwards and Morrison; many

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others from Messrs. Strecker and Geddes. I have also seen some of the best collections in the United States, and studied all, or almost all, the large mass of scattered literature and notes on the genus by Messrs. W. H. and H. Edwards, Mead, Geddes, Scudder, and Strecker. I have repeatedly tried to construct a key by which the supposed species could be identified, and can only say that I have completely failed. I am certain that no entomologist, who received to-day the most perfect collection which could be got together from all parts of North America, and had to classify and describe them without regard to the work of others, would make anything like as many species as have been recognised. It seems presumptive for a man to set aside much of what has been written by those who have seen, both living and dead, so many more specimens than I have seen, and yet I cannot, in dealing with the American forms, adopt as specific, characters so slight and variable that they would not be recognised as such in the much better known European species. And to show that it is not my ignorance alone which makes the difficulty, I may say that it is just those species which I have personally observed in life, and which I have most carefully examined, such as *A. eurynome*, *A. liliana*, *A. monticola*, and *A. meadii*, in which I have found my uncertainty the greatest. Mr. Strecker's remarks, on p. 118 of his Catalogue, are so much to the point that I will quote them here, and can only say that if our American colleagues do not agree with them, let them rather point out how others may understand their conclusions, than blame me for not adopting what I cannot see:—"The Argynnides of the western slope, or Pacific side of the Rocky Mountains, are without doubt, if we except, perhaps, the Coliades, the most difficult of all the North American Diurnæ to deal with, as they not only run into certain variations, but again into subvariations, and even further. The two species *monticola* and *zerene*, first considered identical by Dr. Boisduval, are perhaps the most perplexing; each of these bears the same relation to some of their varieties as does *niobe* to its var. *eris*, and *adippe* to *cleodoxa*, but presenting by no means the stability of forms of these European variations, but branching out into endless and endless varieties until the student is completely at a loss to know where or to what they may belong."

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Scudder, in the 'Butterflies of New England,' has figured the abdominal organs of several species of *Argynnis* on Plate 33, which gives an opportunity of comparing some nearly allied species. Those of *A. cybele*, fig. 44, *A. aphrodite*, fig. 40, are very similar indeed, but as they do not appear to agree exactly with the descriptions, and the figure of that of *aphrodite* is not alluded to in the description on p. 565, I do not know whether the description was made from the same specimens figured, and whether we are to attribute the difference to variation, or to incorrect drawing. The clasper of *atlantis* (fig. 36), also much resembles those of *cybele* and *aphrodite*, but has the hook longer and nearer the clasp. The figures of the androconia of these three species (Plate 46, figs. 12, 13, 14), are also very similar, and, taken in connection with the claspers, do not lead one to suppose that very much help will be given in deciding the relationship of nearly allied species in this genus by a microscopic examination. The claspers of *A. myrina, bellona*, and *montinus* (Plate 33, figs. 35, 38, 42), all included by Scudder in the genus *Brenthis*, show a general similarity of form *inter se*, with the same minor differences as those of *cybele, aphrodite*, and *atlantis*. I at first supposed that some difference might be found in the scales clothing the median veins in the males, but on examination with a powerful lens *idalia* is the only North American species in which the raising is conspicuous, though in some specimens of *atlantis* and *aphrodite*, and others, it is clearly perceptible. The tuft of silky hairs on the subcostal nerve is present in the males of all the larger species that I have examined, and is very conspicuous in *idalia*, but I have not found it in the smaller species which have been separated under the genus *Brenthis*.

A. idalia and *A. diana* are two of the most beautiful species in the whole genus, and may be said to form the best links between those species of Eastern Asia, which end the Palæarctic series, and the American species, which are isolated from them. *A. diana* has the sexes more different than any except *sagana*, and if the genus was divided into groups would be another instance of an American species having its nearest affinities in North-eastern Asia and Japan, of which we have several among the plants of the Alleghany Mountains.

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A. aphrodite, A. cybele, A. alcestis, A. cypris, A. halcyone.—This is a group of species or forms which are extremely hard to define, and though Edwards and Scudder, and most other North American entomologists, agree in keeping them separate, I think it is very difficult, if not impossible, to identify them unless you know their habitat. I have a pretty good series of all except *cypris*, which must be very close to, if not identical with, *alcestis*, and, judging by the character of the median veins in the fore wing of the male, and by the colour and pattern of the under side, which are the best characters I know by which to define the species, I am certainly inclined to follow Strecker rather than Edwards. There have been so many mistakes made in identifying these species by collectors that their geographical distribution is not very easy to follow out; though Mr. Scudder's maps are useful, they are by no means infallible, and the northern and western range of *aphrodite* and *cybele* is certainly not defined at present. I received from Morrison a pair of *cybele* from Montana, which agree with those taken by Geddes in the North-west Territory of Canada, near Edmonton, in being smaller than those from the eastern states. According to Scudder and Edwards, however, *cybele* does not occur in Montana, and the Edmonton habitat is quite isolated; whilst *aphrodite*, which is unmentioned by Geddes in his lists of north-western butterflies in 'Canadian Entomologist,' vols. 15, p. 221, 16, pp. 56 and 224, is stated by Scudder and Edwards to occur at Edmonton. Either such experienced collectors as Morrison and Geddes did not know *aphrodite* when they saw it out of its usual range, or Scudder and Edwards are mistaken. Though it seems undoubted that typical eastern specimens of these species can be distinguished (for the points of difference see Scudder, p. 566), yet the differences are so slight that it may not be possible to identify western specimens with one or the other, and this difficulty seems to have been got over in Edwards' case by creating other species, such as *alcestis*, *cypris*, and *halcyone*, which cannot be identified with any certainty from his figures or descriptions; and which, notwithstanding all that has been written upon them, must remain, as far as I can see, "species dubiæ" to those who have not specimens identified by their author at hand for reference.

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A. leto is a species which, though undoubtedly nearly allied to *cybele*, is fully as distinct from it as *nokomis*, and may be regarded as its Pacific coast form, in the same way as *nokomis* is the form of the dry central plateau of the continent. Though the male is not very different from the male of *cybele*, yet the female, which on the upper side is hardly distinguishable from the females of *nokomis* and *nitocris*, is marked by the strong contrast between the deep chocolate, almost black, of the base and inner area of the wings and the pale yellowish colour of the outer area. Its range extends along the Pacific coast from Central California to Washington Territory, and it is recorded also by Geddes from Fort Macleod, in the North-western Territory of Canada, on the eastern side of the mountains. Those I have from Washington Territory are considerably darker at the base of the hind wings than others from Plumas County, California; and I should not be at all surprised if a large series from different localities were to show forms intermediate both with *cybele* and *nokomis*.

A. carpenteri is unknown to me, except from the description, which seems to point to a form of *cybele*. It was described from two males and one female taken by Dr. Carpenter in New Mexico at a high elevation above the timber line, and is said by Mr. Edwards to be of the size of *atlantis* and near *cybele*.

A. nokomis and *nitocris* are regarded by Edwards, in his last catalogue, as distinct; he cites, however, Strecker's figure of *nokomis* female, in Ruffner's Report, as an aberration of *nitocris*. This is just one of those cases which prove how difficult it is to follow Edwards's authority in such matters. It so happens that I have two excellent pairs of *nokomis* from Arizona, sent by Mr. H. Edwards, which exactly agree with Mead's figure cited by Edwards. I have also a pair of *nitocris*, the male from Utah, sent by Mr. Strecker, the female from Arizona, agreeing with it, is marked by Mr. H. Edwards, "I think this species passes as *A. nitocris*, female." It differs from *nokomis* in having the under side of hind wing to the second row of spots cinnamon-colour, as in *cybele*, and is exactly intermediate between *nokomis* and *leto*. The specimen figured by Strecker in Ruffner's Report, and cited by Edwards as an aberration of *nokomis*, is, to my eye, much more like *leto* than it is to

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nitocris or *nokomis;* and Mr. Strecker's remarks are as follows:—"The present two examples from Colorado differ notably from all those from Arizona in the following particulars: On under surface the red colour of primaries is darker, and covers evenly the whole wing except toward and at the apex; on the secondaries the whole space interior to the second of the two outer rows of silver spots, which in the Arizona examples is powdered greyish green, is deep reddish brown, nearly of the same colour as in the female of *aphrodite*, or the male of *leto;* they are larger than most of those I have seen from Arizona. On the upper side it presents no differences. I have always contended that *nokomis* was a pale abnormal form of *cybele*, of which we have so many other instances in other species from the dry salt regions of Utah and Arizona, and these intermediate examples from Colorado, with their dark reddish under sides, seem to strengthen my opinion. I can but regret that no males were captured (unless the following be really its male)*, as I consider this is by far the most interesting insect in the whole collection."

A. aphrodite is a very wide-ranging species, which varies enough in the Western States to have received at least three names, for I cannot see how to distinguish *alcestis* or *halcyone* in the perfect state, though Edwards says that the larva of *alcestis* is different, and places *halcyone* in a different subgroup with *coronis*, *calippe*, and *edwardsi*, on account of the larger and more egg-shaped form of the silver spots on the under side. When, however, a good series is compared together (I have sixteen males and twelve females of this group from various States), I cannot see that his supposed distinctions are constant, and though *nausicaa*, of which I have four males and five females, taken by Messrs. Hulst and Morrison, is distinctly of a deeper red on the upper surface than any of the rest, yet its under side, like that of *halcyone*, has nothing sufficiently marked to distinguish it. Mr. Edwards perhaps would say that my *halcyone*, which were sent by Mr. Strecker, and taken near Denver, are not true to name; but what else can they be from that locality? It only shows that if a describer

* This is put down as *cybele* by Mr. Strecker, who is astonished at receiving it from Colorado, and is strongly inclined to the belief that it is the male of the above described form of *nokomis*.

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of insects does not make his descriptions sufficiently comparative and clear to be followed by others, he must not be surprised if others refuse to accept them. Larval characters alone, which are liable to vary like those of the perfect insect, and which cannot be easily compared by others, are not in my opinion sufficient. With regard to *A. nausicaa*, however, I see a point not alluded to by Mr. Edwards, which may be sufficient to separate it, namely, the much less abundant and shorter tuft of hairs on the subcostal vein of the hind wing in the males. This tuft is prominent in all males of *aphrodite*, *alcestis*, and *halcyone* which I have examined; in *nausicaa* it is much less conspicuous, and, taken in conjunction with the isolated habitat and deeper colour, is probably enough to distinguish it.

A. atlantis is another species which I find it uncommonly difficult to decide about, not so much when the eastern form alone is before me, but when the numerous western species or forms have to be considered. Mr. Edwards has got over the difficulty by naming them all separately, and Mr. Scudder, though he was not perhaps obliged to mention them in the 'Butterflies of New England,' says nothing as to their very near relationship. He remarks as follows:—"There is no need of confounding this species with either of the preceding [*aphrodite* and *cybele*]: it is smaller than they, duller in tint above, has a blackish border to all the wings in both sexes, and more continuous mesial band on the upper surface of the hind wings; the darker colours of the under surface of hind wings are deeper in hue than in either of them, while the buff belt is wider than that of *aphrodite* and narrower than that of *cybele;* the buff scales on the basal half of the wing also assume more importance than in the other species; finally the costal border of the fore wings does not appear to be quite so much arched. It is possible, perhaps even probable, that this species is the true *Papilio aphrodite* of Fabricius, but as it is quite impossible to be certain of it, the names ought to stand as given by Mr. W. H. Edwards, who first clearly distinguished the species in this difficult group. The species were still confounded in the British Museum, after the publication of Butler's Fabrician butterflies, as I myself saw, and notwithstanding Butler's remarks on p. 108 of that work." Its

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distribution, according to Mr. Scudder, is much the same as that of *cybele* and *aphrodite*, but extends to Newfoundland, Labrador, and the Hudson Bay Territory: on Mead's authority he also gives Colorado, but Edwards calls the form found here *electa*, which also ranges into New Mexico and Montana. Whether this is the same or not I cannot be certain, as the description of *electa* in 'Field and Forest' is inaccessible; but I have a pair from Colorado, given me by Mr. Holland (which are named *electa*, I believe, by Mr. Edwards), and a female from S.W. Colorado, taken by Morrison, which I cannot separate from *atlantis*. Mead also gives a clue to the correctness of this identification with *atlantis* by mentioning the strong musky odour of the Colorado species, a peculiarity of *atlantis* to which Scudder calls attention. Geddes says that *atlantis* occurs in all parts of the Rocky Mountains north of the American boundary which he visited, and if this is correct, it can hardly be absent from Montana and Colorado. But at the same time I must say that the male of so-called *electa* does not differ from the female as does another male from Colorado (sent by Mr. H. Edwards as *hesperis*) in having the silver spots of the under side partially obsolete. If, therefore, *hesperis* and *atlantis*, which are placed next to each other by Mead, and stated to occur at the same elevation in Colorado, run into each other, as they seem to do, we are lead into the belief that *atlantis* is liable, in the west, to the disappearance of the silver spots, which takes place in other American and European species; and then there is no reason why some of the forms which occur on the Pacific States, such as *columbia*, should not also belong to *atlantis*. I do not say that they are so, because it would be unwise to do so without knowing them in nature better than I or any living American naturalist does; but on the other hand I can see nothing in the writings and figures of Mr. Edwards to prove the contrary, or to enable others to distinguish them. *A. columbia*, H. Edw., was by him considered as so near to *atlantis* that it might be only a variety of it. It was described from four males taken at Lahache, near the Alaskan border of British Columbia, and there is nothing in the description worthy of note; but, when going through Mr. H. Edwards's collection, I noted it as similar to *hesperis*.

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A. lais, of which I have seven of the specimens from Red-deer River, from which the species was described, seems to me very near *atlantis*, but separable by the smaller size, paler colour, and apparently by the less raised scales of the submedian veins in the male. Edwards, however, says it is the size of *atlantis*, and stands between that and *aphrodite*. Geddes does not tell us how to distinguish them, but says that it was found on the prairies about Fort Edmonton, while *atlantis* occurred in the mountains.

A. coronis is a species which seems to have a very wide range west of the Rocky Mountains, and varies a good deal, but may be recognised in most of its forms by the large ovoid silver spots of the under side of the hind wing. It is apparently most nearly allied to *edwardsi*, with its forms *nevadensis* and *meadii*, but these differ in the longer, narrower shape of the fore wing, and do not seem to be found on the Pacific coast. There occur, however, in Nevada forms which are described as *laura* and *macaria*, of which I have authentic specimens from Mr. H. Edwards, and which, by their under sides, seem to be *coronis*; whilst *chitone*, also sent by Mr. H. Edwards from Nevada, does not agree with W. H. Edwards's description on the under side, and is nearer to *nevadensis*. None of these names can, in my opinion, be retained except as synonyms, though they are all three kept up in Mr. W. H. Edwards's 1884 Catalogue as distinct species.

Whether *edwardsi*, *nevadensis*, and *meadii* are distinct is a more doubtful question. Certainly *meadii*, which I have taken in the Yellowstone Park, looks very different from the large *edwardsi* of Colorado, but I have some from Montana, taken by Morrison, and from the N.W. Territory of Canada by Geddes, named *nevadensis*, which are perfectly intermediate in size and colour; whilst others, sent by Strecker as *nevadensis* from Colorado, resemble *aphrodite* in the colour of their hind wings below. Mead says:— "The three closely-allied species, *edwardsi*, *nevadensis*, and *meadii*, seem to be related to each other in much the same way as the eastern *aphrodite*, *cybele*, and *atlantis*. In *edwardsi* the pale submarginal band below is narrower, and sometimes almost obsolete, as in *aphrodite*, and it ranges up to greater elevations than *nevadensis*. which has this band comparatively broad in

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both sexes, as we see it in *cybele*. *Meadii* differs from either in tint, especially the female; it is somewhat smaller, and probably, like *atlantis*, is exclusively confined to the mountains. The peculiar bright green coloration of the under side of secondaries in *meadii*, however, has no parallel among our fritillaries."

A. callippe is, in its typical form, which occurs all through the lowlands of California, a very distinct species; but *liliana* is, according to Mr. H. Edwards, intermediate between it and *coronis*, and the specimen which he sent me as typical of it does not agree with those which Mr. Godman and I took abundantly near Los Angeles, some of which Mr. H. Edwards afterwards named *liliana*, though I should certainly call them *callippe*.

A. semiramis, again, is a South Californian form, which has been taken by Mr. Wright in the mountains separating the San Bernadino Valley from the Mohave Desert, and of which I have six specimens from him, as it was not yet out when I visited these mountains in May, 1888. To my eye it is nothing more than a form of *coronis*, in which the black markings of the upper side have become paler and more reduced, as might be expected from the arid character of the country where it is found. Edwards says:—"It is curious how the markings resemble two such distinct species as *adiante* (upper side) and *coronis* (lower side)."

The species allied to *monticola*, namely, *zerene* and *bremneri*, have puzzled me quite as much as Edwards, Strecker, and others, and I do not see how the difficulties of their synonymy can ever be cleared up; but I can only say that, if I have not succeeded in arranging them correctly, it is not from idleness or carelessness, but on account of the impossibility of identifying species or forms described in such a way as these have been. Many of the names cannot be certainly identified, and had better be dropped. I think, however, that three more or less distinct forms can be recognised among the very numerous specimens which I have from the Pacific States. There are a larger form *monticola*, and a smaller form, which both Messrs. H. and W. H. Edwards call *zerene*, Bdv. These both vary extremely on the under side, but in *monticola* the males occasionally, and the females usually, have more or less silvery spots;

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whilst in *zerene* the duller and paler colour of the under side is without any silver except on the marginal row. These distinctions, however, are based upon Californian specimens, mostly from the Shasta district, and, according to Edwards's opinion in 1879 (see Can. Ent., pp. 55—6), do not apply to Nevada specimens. He then considered *monticola* to be only a var. of *zerene*, but puts them down as two species in his catalogue of 1884. Farther north, in the damper climate of Oregon and Washington Territory, as also commonly in Vancouver's Island, a darker form, *bremneri*, occurs, which on the under side is well spotted with silver in both sexes, and might be considered as the Pacific coast form of *atlantis;* but in the specimens taken on Mount Hood by Morrison (*rhodope*, Edw.), and also occasionally in Vancouver, the silver is absent, and these specimens might well be considered as a northern and darker form of *zerene*.

A. hippolyta, which is also kept up by its author as a species, is described without reference to its allies, and seems to be something intermediate between *hesperis* and some form of *zerene* or *monticola*. Its locality would indicate that it may be nearer to them than to *atlantis*. It was described from four males and one female only.*

A. adiante is a form which both Strecker and Edwards consider distinct, and which appears to be very local. On the coast of California, according to Strecker's information, it is now extinct, and all the male specimens (I have seen no females) in Mr. Godman's and my collection are evidently taken many years ago. But, though the markings on the under side are nearly obsolete in some cases, and in all faint compared with those of *zerene* or *monticola*, yet they seem to be quite identical, and I should certainly be inclined to set it down as a variety of one of those species. This is just a case in which one would be guided by the opinion of local collectors, but neither Mr. H. Edwards or any one else of late years seems to have mentioned this species, and the opinions held twenty-five years ago, when Dr. Behr was an active collector, are not conclusive.

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* Mr. Strecker informs me that *hippolyta* was described from some small examples of *bremneri*, given by Mr. O. B. Johnson, of Oregon, to Mr. Dodge, of Nebraska, who gave them to Mr. W. H. Edwards. Some of the same catch and lot were also given to Mr. Strecker.

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The intricacy and confusion of nomenclature among the next group of Argynnides, which inhabit the Rocky Mountains and Pacific States, is as great as among the last, but I have in this case followed Edwards's identifications of Behr's and Boisduval's species, which are supported by the named specimens sent me by Mr. H. Edwards, rather than the arrangement of Strecker's Catalogue, which makes *montivaga* and *egleis* varieties of *zerene*, Bdv. I cannot, however, follow Edwards in separating *clio* and *artonis* from *eurynome*, and Geddes, who took them in the Northern Rocky Mountains, agrees with me in considering them as synonyms. As to *opis* and *bischoffi*, I am more doubtful, having seen but few specimens; but in these, as well as in Edwards's figures I can see no specific characters, and should consider them as northern varieties, differing only, as might be expected, in rather smaller size and duller coloration. Whether *montivaga* and its var. *egleis* are really distinct from *eurynome* and its varieties is hard to say; they seem to have the fore wings rather longer and the under side less tinged with green: they may, perhaps, best be treated as the west coast representative of *eurynome*. Edwards says of *egleis* (Can. Ent., vol. ii., p. 54) that whatever the variation in other respects (and he allows it to be very variable), the spots of the second and third rows on the under side of hind wing are heavily edged with black on the basal side. But I have specimens of *montivaga*, collected by Morrison in Nevada (of which sixty were also examined by Edwards), and others from the Sierra Nevada, California, named *montivaga* by H. Edwards and Strecker, which have the same character, and in some specimens of *eurynome*, taken by myself in the Yellowstone Park, the same black edging is more or less present.

I have also specimens of *arge*, Streck., from Strecker and Mr. Holland, both from Spokane Falls and California, which are undoubtedly the same as *erinna*, which was described in 1883 as a var. of *eurynome* by Edwards, and in his Catalogue of 1884 is put down as a variety of *montivaga*. If, therefore, he is himself so uncertain of the true position of these forms, he cannot expect others to follow him blindly, and though many years must elapse before any certain conclusion will be come to, I venture to think that the arrangement I have adopted

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represents the facts shown by my collection, including about fifty specimens from all the States where the species occurs, and from many of the collections which supplied his own materials. If it should eventually prove that the Pacific coast form is not separable from the Rocky Mountain form *montivaga*, it may be better to use the name *eurynome* in preference to *montivaga* or *egleis*, because both Behr's and Boisduval's descriptions, which have priority over Edwards's, can only be identified with doubt. My specimens of *montivaga* and *egleis* all come from the Sierra Nevada, and not from the Mt. Shasta district, where *monticola* and its vars. are so abundant; but local information as to their distribution in this, as in other cases, is very deficient.

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XXIII. *Additional notes on the genus* Hilipus. By Francis P. Pascoe, F.L.S., &c.

[Read November 6th, 1889.]

Plates XVI. & XVII.

For certain preliminary observations I must refer to my paper "On the genus *Hilipus*, and its Neo-Tropical allies," in the Society's 'Transactions,' published April, 1881. As far as appearance or facies goes, it will be seen that the species here exhibited differ considerably from one another, and this is so almost throughout the genus. I have seen about 300 species, many of which are still undescribed.*

In the following list I have, as before, followed Schönherr's arrangement—an extremely artificial one, as Lacordaire justly observes, but in the present state of our knowledge the most convenient:—

The two basal joints of the funicle equal or nearly equal in length.
- Apex of the elytra rounded.
  - Elytra without tubercles or granules.
    - *Hilipus pardalis.* *Hilipus fimbriatus.*
    - ,, *excultus.* ,, *Fryi.*
  - Elytra with tubercles or granules, or both.
    - *Hilipus validus.* *Hilipus decipiens.*
    - ,, *ocularis.* ,, *obtusus.*
    - *Hilipus lutosus.*
- Apex of each elytron pointed or acuminate.
  - *Hilipus ludiosus.* *Hilipus arcturus.*

Second joint of the funicle longer than the first.
- Apex of the elytra rounded.
  - Elytra without tubercles or granules.
    - *Hilipus congestus.* *Hilipus angusticollis.*
  - Elytra with granules or transversely rugose.
    - *Hilipus frontalis.* *Hilipus polyspilus.*
    - ,, *latipennis.* ,, *lamina.*
    - *Hilipus tetraspilotus.*

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* *Hilipus alternans*, Guer. (Icon. Regne An. Ins., p. 152), is, I think, from the description identical with *H. hipporhinoides* (Trans. Ent. Soc. Lond., 1881, p. 75); "clavatis," fifth line from the bottom, *read* elevatis.

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Apex of each elytron pointed or acuminate.
Elytra transversely rugose.
Hilipus basiliscus. *Hilipus Renei.*
Elytra tuberculate.
Hilipus phrynodes. *Hilipus arrogans.*
First joint of the funicle longer than the second.
Hilipus designatus. *Hilipus cornix.*

Hilipus pardalis. (Pl. XVI., fig. 5).

H. oblongo-ovatus, fusco-castaneus, subnitidus, maculis flavo-squamosis decoratus; rostro pedibusque nitide ferrugineis, illo recto, subtiliter punctato; oculis approximatis. Long. 6 lin.

Hab. Sarayacu.

Oblong-ovate, chestnut-brown, somewhat glossy, with clear yellow spots of varying size composed of narrow scales, the head over and between the eyes, and base of the rostrum covered with similar scales; eyes approximate; rostrum straight, not stout, glossy rufous, and minutely punctured; antennæ ferruginous, two basal joints of the funicle equal, third and fourth much longer than broad; prothorax equal in length and breadth, the disc with a few minute punctures, on each side six or seven spots; scutellum small, subcordiform; elytra not much broader than the prothorax, narrowing from the shoulder, seriate-punctate, punctures largest towards the suture, on each side about fifteen spots of varying size; body beneath dark pitchy, with small remote scales; legs rufous; stoutish femora and tibiæ.

This species has a perfectly straight rostrum, the scrobe scarcely passing beneath; the eyes are closely approximate in front.

Hilipus lutosus.

H. ovatus, rufo-testaceus, subnitidus, griseo-squamulosus, supra granulatus; rostro mediocre, fere recto, punctato; antennis longe apice rostri insertis; funiculo breviusculo; elytris transversim granulatis. Long. 5 lin.

Hab. Columbia.

Ovate, shining, reddish-testaceous, with minute greyish scales; rostrum moderately stout, longer than the prothorax, nearly straight, finely punctured; antennæ inserted nearer the middle of the rostrum than the apex, the funicle rather short, the two basal joints of nearly equal length, the last five shorter than the club; prothorax transverse, not narrowed at the base, with many unicolorous flattish granules, the intervals with greyish or whitish

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filiform scales; scutellum scutiform, closely covered with pale greyish scales; elytra conspicuously broader than the prothorax, flattish, seriate-punctate, the apex rounded, posteriorly the scales are closer together, forming an indistinct whitish band; body beneath and legs with numerous minute scales; first abdominal suture nearly obsolete; tibiæ short, fore-tibiæ curved, scarcely bisinuate.

Colour, the insertion of the antennæ towards the middle of the rostrum, and the short funicle, are the principal characters of this species, but I know of none with which to compare it.

Hilipus Fryi. (Pl. XVI., fig. 8, var.).

H. oblongus, niger, nitidus, prothorace elytrisque lineis silaceo-squamulosis, bene determinatis et perplexe figuratis, ornatis, rostro subtenuato; pedibus rufo-piceis. Long. 6—7 lin.

Hab. Peru.

Oblong, black, shining, with narrow, very distinct lines of small silaceous scales, forming complex patterns; rostrum moderately slender and curved, finely punctured; antennæ pitchy, the first two joints of the funicle elongate and equal; prothorax somewhat longer than broad, the sides very slightly rounded, a little depressed posteriorly and nearly obsoletely punctured; scutellum broadly cordiform; elytra much broader than the prothorax, gradually narrower towards the apex, moderately convex, and distinctly seriate-punctate; body beneath blackish; legs reddish-pitchy, with a few scattered white piliform scales.

Allied to *H. mysticus* (Trans. Ent., 1881, p. 67), but more robust, a stouter rostrum; a broad cordiform scutellum; broader and more convex elytra, more distinctly punctured; and longer tibiæ. The specimen I have here described has a sort of figure of 8 pattern on the basal half of each elytron; posteriorly the pattern is more complex and includes three patches—the middle one triangular. The individual figured is the extreme form of a variable species, well represented by intermediate forms in Mr. Fry's collection, and to whose unfailing generosity I am indebted for my specimens.

Hilipus excultus. (Pl. XVII., fig. 3).

H. suboblongus, rufo-piceus, squamis, plerumque rotundatis, silaceis, plagiatim variegatus; rostro rugoso confertim punctato;

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capite inter oculos linea transversa impressa; elytris, parte glabra, punctis majusculis remote instructis. Long. 7 lin.

Hab. Brazil.

Moderately oblong, reddish-pitchy, variegated with large patches of silaceous, mostly rounded, scales; rostrum and legs rufous; head with a transverse linear impression between the eyes; rostrum rather stout, roughly and closely punctured; antennæ ferruginous; two basal joints of the funicle equal and nearly as long as the rest together; prothorax as long as broad, the sides very slightly rounded, except anteriorly, on each side an irregular silaceous stripe, and at the base a few transverse granules; scutellum small, oblong, rufous; elytra considerably broader than the prothorax, the sides, except behind, nearly parallel, the apex of each rounded, on each side two large indented silaceous patches, the posterior behind the middle, with a few small spots towards the suture; body beneath pitchy, spotted at the sides.

H. comptus is a longer species, black and opaque, the prothorax and elytra minutely punctured, with a larger, round, black scutellum, &c.

Hilipus fimbriatus. (Pl. XVII., fig. 1).

H. oblongus, fuscus, squamulis griseis vestitus, plagis (circa septem) fusco-velutinis, silaceo-marginatis, ornatus; rostro crassiusculo, basi tricarinato; antennis piceis, clava parva. Long. 5 lin.

Hab. Brazil.

Oblong, brown, opaque, covered with small greyish scales, varied with fine large dark brown velvety patches; rostrum moderately stout, the base with three raised lines; antennæ pitchy; two basal joints of the funicle elongate, equal, the last four rounded; club not half the length of the funicle; prothorax nearly as long as broad, obsoletely punctured, the middle with a raised longitudinal line, the sides with a broad velvety stripe margined above and below with a line of silaceous scales; scutellum punctiform; elytra broader than the prothorax, gradually narrower behind, the apex narrowly rounded, the base with two small patches, the side with a large one curved beneath, and another transverse towards the apex, all finely margined with silaceous scales; body beneath and legs rather closely covered with dull greyish scales, setæ intermixed; tibiæ slender, faintly bisinuate.

This species may serve to recall *H. jocosus*: it is remarkable for its small club, not so long as the last four joints of the slender funicle taken together.

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Hilipus validus. (Pl. XVI., fig. 6).

H. robustus, ovatus, convexus, fuscus, squamulis obscure silaceis vestitus, supra granulatus; prothorace subgloboso; elytris nonnihil cordiformibus. Long. 8 lin.

Hab. Minas Geraes.

Stout, ovate, convex, brown, covered with dull silaceous piliform scales; eyes large, ovate; rostrum moderately slender, the basal half narrowly ridged; antennæ pitchy; two basal joints of the funicle subequal, the third a little shorter than the second, the last three round; club only half as long as the funicle; prothorax subglobose, broader than long, disk with a slightly raised line anteriorly and dotted with several small granules; scutellum small, ovate; elytra somewhat cordiform, broadest at the middle, narrowly rounded at the apex, finely striate, the interspaces irregularly granulate, a nearly transverse curved pale band behind the middle, and similarly coloured spots at the base; body beneath dark brown, with patches of silaceous scales, especially on the sides of the metasternum; inner margins of the tibiæ bisinuate, tarsi with the basal joint nearly as long as the next two together.

A very robust species, not allied to any other known to me. The femoral tooth is much smaller than is usual in this genus.

Hilipus decipiens.

H. subanguste ovatus, convexus, rufo-piceus nitidus, vitta lata utrinque irregulari pallide silaceo-squamosa, decoratus; prothorace oblongo; elytris in medio granulatis, apice rotundatis. Long. 6 lin.

Hab. Columbia.

Rather narrowly ovate, reddish pitchy, shining, each side densely covered with pale silaceous scales, forming a broad very irregular stripe, leaving a narrow oblong glabrous patch between, and another on the outer margin; rostrum slender, slightly curved, roughly punctured at the base; antennæ dark testaceous; funicle elongate, the two basal joints equal and nearly as long as the rest together; club elliptic; prothorax apparently longer than broad, the middle with a few large punctures; scutellum nearly round; elytra not depressed at the base, considerably broader than the prothorax, gradually narrowing from the shoulder to the narrowly rounded apex, the middle glabrous portion with flattish glossy granules; body beneath and legs pitchy; tibiæ slender, curved, the inner edge nearly entire.

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H. tricolor will give a good idea of the style of coloration of this species, although the colours are somewhat different. It might at first be easily mistaken for *H. basiliscus*, figured on Pl. XVI., fig. 4.

Hilipus ocularis. (Pl. XVII., fig. 2).

H. sat breviter ovatus, convexus, niger, guttis parvis albidis aspersus; oculis approximatis; rostro subtenue, punctulato; antennis rufis; funiculo articulis, duobus basalibus subovalibus; elytris seriatim granulatis. Long. 5 lin.

Hab. Sarayacu; Ega.

Rather shortly ovate, convex, black, dotted with small remote spots composed of whitish scales; eyes large, ovate, approximate above; rostrum somewhat slender, slightly curved, faintly punctured, the basal half sharply ridged; antennæ reddish ferruginous; the two basal joints of the funicle nearly equal, the rest more or less transverse, the club as long as the rest—except the first—together; prothorax not so long as broad at the base, strongly and closely punctured; scutellum round; elytra broader at the base than the prothorax, narrower posteriorly and well-rounded at the apex, seriate-punctate, punctures crowded, coarse, intermixed with glossy granules, the intervals with a few minute slender silaceous scales; body beneath and femora pitchy; tibiæ rufescent, faintly bisinuate.

A short convex species, the eyes nearly contiguous above, as in *H. guttatus*, to which it is allied; but it wants the large patches on the prothorax and elytra, the latter are broader and more rugose, and the apex is not narrowly rounded as in that species. Boheman gives Cuba as the habitat of *H. guttatus;* my specimens are from St. Domingo and Chontales.

Hilipus obtusus.

H. ovatus, niger, silaceo-squamosus, supra tuberculatus; rostro elongato, tenuato, vix arcuato, subtiliter remote punctato; elytris postice subtruncatis, in medio utrinque fusco-nebulosis. Long. 5 lin.

Hab. St. Catharine's.

Ovate, black, with minute approximate, silaceous or greyish scales; rostrum slender, almost straight, nearly twice as long as the prothorax, minutely and remotely punctured; antennæ testaceous, with numerous greyish setaceous scales; funicle with

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the two basal joints equal, and of moderate length; club broadly ovate, distinct; prothorax scarcely broader than long, very convex, well-rounded at the sides and narrowed at the base, with large, opaque, closely approximate, granules; scutellum subtriangular; elytra much broader than the prothorax, abruptly declivous posteriorly, the super-apical tubers prominent, the sides clouded with brown, at the base a few minute punctures, the back unequal and tuberculate, the largest tubercles—about six or seven—occupying an oblong crest on the middle of each elytron; body beneath and legs blackish, opaque, clothed more or less with ochreous hair-like scales.

In some respects like *H. Marklini*, but more robust, more uniformly coloured, and, for this genus, an unusually slender rostrum.

Hilipus ludiosus. (Pl. XVII., fig. 8).

H. sat breviter ovatus, piceus, utrinque vitta albido-squamosa irregulari, ornatus; rostro basi sulcato; funiculo breve; tibiis tarsisque ferrugineis. Long. 5 lin.

Hab. Parana.

Rather shortly ovate, pitchy, an irregular broad whitish stripe, running round the sides of the prothorax and elytra, not meeting anteriorly, and more or less indented on the elytra; rostrum moderately stout, four longitudinal impressions at the base, the two middle ones shorter and more developed; eyes not approximate; antennæ pitchy, funicle short, the first two joints equal, the remainder very transverse, the club as long as the funicle, except the first joint; prothorax about equal in length and breadth, the sides well-rounded, the base slightly contracted, closely punctured between the stripes, the punctures varying in size; scutellum scutiform; elytra moderately convex, the sides nearly parallel, the apex of each slightly acuminate, seriate-punctate, in each puncture a small white scale; body beneath pitchy; tibiæ and tarsi ferruginous, two basal joints of the latter broadly triangular.

Facies of *H. tricolor*, but with a short funicle scarcely longer than the club, the rostrum sulcate at the base, &c.

Hilipus arcturus. (Pl. XVII., fig. 7).

H. suboblongus, umbrinus, squamulis minutis silaceis adspersus, elytris pone medium plaga velutina fusca postice silaceo-marginata, ornatus; rostro recto, punctulato; antennis piceis; funiculo

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articulis duobus basalibus vix elongatis, æqualibus, clava majusculo. Long. 6 lin.

Hab. Bahia.

Suboblong, umber-brown, with minute silaceous remote scales, behind the middle of the elytra a dark brown velvety patch, bordered behind with a narrow line of silaceous scales; rostrum straight, finely punctured; antennæ pitchy; first two joints of the funicle scarcely elongate, equal, the last three transverse; club as long as the last five joints of the funicle together; prothorax slightly transverse, broadest at the base, obsoletely punctured; scutellum oblong, covered with silaceous scales; elytra considerably broader than the prothorax, flattish at the base, the sides nearly parallel, but suddenly rounded posteriorly, the apex of each subacute, the anterior two-thirds obscurely punctured, the intervals transversely granulate; body beneath and legs reddish brown, the latter with remote filiform silaceous scales; tibiæ rather short, bisinuate.

In Schönherr's arrangement this species should be placed in the same "centuria" as *H. leoninus*, *trachypterus*, and other discordant forms; in facies it is more like *H. Faldermanni* than any other known to me.

Hilipus congestus.

H. oblongo-ovatus, niger, nitidus, maculis numerosis parvis silaceo-squamosis, irroratus; rostro pedibusque rufis; prothorace subtransverso, subtiliter punctato; elytris seriatim punctatis, apice rotundatis. Long. 6 lin.

Hab. Pará.

Oblong-ovate, black, shining, the eyes surrounded with reddish scales, a few spots also of reddish scales on the prothorax, the elytra speckled with paler or silaceous scales; eyes approximate in front; rostrum slightly curved, irregularly and finely punctured; antennæ pitchy; funicle elongate, the second joint nearly half as long again as the first, the remainder round; prothorax slightly transverse, well-rounded at the sides, and nearly obsoletely punctured; scutellum cordiform; elytra convex, broadest at the base, slightly narrower posteriorly, the apex rounded, seriate-punctate, punctures minute; body beneath pitchy, middle of the first abdominal segment with a large patch of close-set brownish piliform scales, apical segment with a similar patch; legs glossy reddish ferrugineous; tibiæ elongate, entire.

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H. apiatus, Ol., to which this species may be conveniently compared, has a narrow prothorax, longer elytra, transversely rugose or ridged (the ridges formed by more or less closely connected granules), and the two basal joints of the funicle equal. Found at Pará by M. de Mathan, who collected for M. René Oberthür, to whom I owe my specimen.

Hilipus angusticollis. (Pl. XVI., fig. 3).

H. elongatus, fusco-piceus, elytris maculis numerosis silaceo-squamosis ornatus; prothorace fere cylindrico, quam latitudine dimidio longiore. Long. 8 lin.

Hab. Cayenne.

Elongate, dark pitchy, the elytra crowded with numerous small round spots of silaceous scales; eyes rather small, round; rostrum stout, strongly striate-punctate as far as the commencement of the scrobes; antennæ pitchy; first joint of the funicle somewhat longer than the second, the remainder transverse; prothorax almost half as long again as broad, subcylindrical, flattish above and coarsely punctured, the punctures divided by raised transverse lines, the middle with a short ridge, each side with a band of silaceous scales; scutellum punctiform, glossy black; elytra nearly three times as long as the prothorax, and much broader throughout, the apex broadly rounded; body beneath dark pitchy, nearly free from scales; fore-tibiæ entire.

The contour of *H. lactarius*, but spotted as in *H. apiatus*. It is the *H. angusticollis* of Dejean.

Hilipus tetraspilotus. (Pl. XVI., fig. 2).

H. ellipticus, æneus, capite femoribusque nigris; elytris seriatim punctatis, singulis maculis magnis rufo-fulvis ornatis. Long. 4½ lin.

Hab. Parana.

Elliptic, brassy, head black, closely punctured; rostrum moderately stout, with five more or less distinct, interrupted, raised lines; antennæ ferruginous; second joint of the funicle longer than the first, the remainder transverse; prothorax much broader than long, closely punctured, the intervals granulate, each puncture with a silvery hair; scutellum subtransverse; elytra scarcely broader than the prothorax, gradually rounded at the sides, seriate-punctate, punctures coarse, apex rounded, each elytron with two large reddish-tawny spots—one before the other behind the middle;

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body beneath pitchy, with scattered piliform scales; legs ferruginous; apex of the femora black; fore-tibiæ grooved.

This species has the elliptic form of *H. cadivus*, which is unicolorous, with the elytra transversely rugulose, &c.

Hilipus frontalis. (Pl. XVII., fig. 5).

H. ovatus, fuscus, squamulis silaceis, plerumque adspersis, vestitus; elytris tuberculatis, squamulis concoloribus dense aggregatis, maculis quatuor formantibus, ornatis. Long. 6½ lin.

Hab. Chontales.

Ovate, brown, with mostly scattered silaceous scales, but condensed on the front of the head, and forming four round patches on the elytra; rostrum moderately stout, slightly curved, the basal half with a few large punctures; antennæ pitchy; second joint of the funicle longer than the first, the remainder together shorter than the club; prothorax transverse, well-rounded at the sides, the disc with a short indistinct ridge behind the apex, and several rather large black glossy granules; scutellum narrowly triangular; elytra broadest at the base, moderately convex, with many glossy larger reddish, more or less conical, tubercles, irregularly disposed on the interspaces of the striæ, the latter most apparent at the sides, the pre-apical callus studded with three or four smaller tubercles, a patch of scales on the shoulder, another near the suture—anterior to the callus; body beneath and legs pitchy, with scattered long whitish hairs.

This species belongs to Schönherr's "Centuria IV." of his second "Stirps," in which there are only two species, *H. Freyreissi* and *H. saxosus;* the latter is unknown to me, and its habitat was unknown to its describer, to whom it was sent by Sommer; it is said to be like *H. prodigialis.* A specimen from St. Catharine's, in my collection, has a somewhat similar facies, but it is not quite so convex, the prothorax not granulate, and there are two apical spots on the elytra in addition, with other minor characters which may, or may not, be specific.

Hilipus latipennis. (Pl. XVI., fig. 1).

H. breviter ovatus, modice convexus, rufo-fuscus, granulis parvis adspersus, elytris pone medium linea albide transversa ornatis;

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prothorace utrinque rotundato, basi angustiore; elytris prothorace multo longioribus. Long. 5 lin.

Hab. Brazil.

Shortly ovate, moderately convex, reddish brown, behind the middle of the elytra a narrow well-marked transverse line of whitish scales; eyes nearly round; rostrum nearly straight, punctured at the base; antennæ rufous; second joint of the funicle slightly longer than the first, third and fourth equal, longer than broad; prothorax slightly transverse, rounded at the sides, the base narrower, disc with a well-marked median ridge and numerous small round and ovate granules, ocular lobes prominent; scutellum semicircular; elytra much broader than the prothorax, not narrowed but broadly rounded at the apex, granules small, numerous, irregularly arranged, the intervals closely covered by minute yellowish scales; body beneath and legs pitchy, with a few small scales.

Very similar to *H. zonatus*, but with broader elytra, prothorax narrowed at the base, &c., characters which at once differentiate it.

Hilipus polyspilus.

H. oblongo-ovatus, subdepressus, rufescens, squamulis silaceis elongatis in fasciculis parvis adspersus; rostro elongato, subtiliter punctato; prothorace confertim granulato; elytris transversim rugulosis. Long. 6 lin.

Hab. South Brazil.

Oblong-ovate, flattish, reddish or reddish-pitchy, dotted with small tufts of narrow silaceous scales; eyes ovate, less than the normal size; rostrum considerably longer than the prothorax, minutely punctured; antennæ slender, second joint of the funicle half as long again as the first, the remainder gradually shorter, the last two only slightly transverse; prothorax much broader than long, the sides moderately rounded, slightly contracted at the base, closely granulate; scutellum punctiform; elytra slightly broader than the prothorax at the base, thence very gradually narrower, the apex rounded, seriate-punctate, the punctures transversely separated by waved raised lines; body beneath and legs unicolorous, with small remote scales; distal extremities of the femora blackish; tibiæ scarcely curved.

In contour like *H. dorsosulcatus* and *insidiosus*, but rather more elongate; both these species differ, *inter alia*, in having the two basal joints of the funicle of equal length.

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Hilipus lamina.

H. sat anguste ovatus, fuscus, subtilissime griseo-squamosus, supra granulatus et tuberculatus; antennis rufis; oculis in maribus fere contiguis; rostro apicem versus conspicue crassiore. Long. 3¼—4 lin.

Hab. Rio Janeiro.

Rather narrowly ovate, brown (or brown with a reddish hue), covered with minute greyish scales (almost dust-like); eyes nearly contiguous in the males; rostrum scarcely longer than the prothorax, considerably thicker towards the apex, and roughly punctured, principally at the base; antennæ pale rufous; funicle slender, the second joint much longer in the male, slightly longer only in the female; prothorax transverse, somewhat contracted at the base, dotted with several very distinct granules; scutellum triangular; elytra broader than the prothorax at the base, slightly narrowed towards the rounded apex, seriate-punctate (punctures nearly obsolete in the female), irregularly tuberculate, tubercles varying in size, a few on the middle of each elytron united and forming a longitudinal crest; body beneath and legs blackish, the latter clothed with long hair-like scales.

Mr. Fry has several specimens of this species taken by himself at Rio. They were, I think, nearly all males; some of them had a concave plate covering the two basal segments of the abdomen, but with the edges, except at the base, considerably raised. One of these, from which I have drawn the above description, was kindly given me by Mr. Fry. I have a pair (♂ and ♀), found by the late Rev. Hamlet Clarke at Petropolis, in which there is no trace of this remarkable structure.

Hilipus basiliscus. (Pl. XVI., fig. 4).

H. oblongo-subovatus, in medio leviter depressus, rufo-piceus, vitta lata utrinque irregulari pallide silaceo-squamosa, decoratus; prothorace transverso; elytris subtiliter granulatis, apice singulatim acuminato. Long. 6 lin.

Hab. Brazil.

Oblong, subovate, reddish-pitchy, each side densely covered with pale silaceous scales, forming a broad irregular stripe; rostrum pitchy, slender, not longer than the prothorax, finely punctured, a slightly raised line on each side at the base; antennæ rufous; funicle elongate, the second joint half as long again as the first, the

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rest together not much longer than the two preceding; prothorax much broader than long, transversely granulate, the intervals minutely punctured; scutellum rather large, subtriangular; elytra broader than the prothorax, flattish at the base, nearly parallel at the sides to beyond the middle, slightly divergent at the apex, each shortly acuminate, the back between the stripes irregularly, and, at the base, transversely granulate, the stripe dotted with glossy minute granules; body beneath and femora pitchy; tibiæ and tarsi testaceous.

This species closely resembles *H. decipiens, ante* p. 581, but the diagnosis given of the two species will at once show the difference.

Hilipus Renei.

H. oblongo-ovatus, niger nitidus, maculis albo-squamosis, hinc inde confluentibus, utrinque ornatus; rostrum breviusculum, vix arcuatum, basi quinque-carinatum; elytris subdepressis, breviusculis, apicem versus gradatim angustioribus, apice seipso acuminato. Long. 6 lin.

Hab. San Paulo Olivenca.

Oblong-ovate, glossy black, the eyes bordered in front by pale silaceous, the sides of the prothorax and elytra with spots, often confluent, of greyish-white scales; rostrum nearly straight, the base with five raised lines; antennæ pitchy; funicle with the second joint much longer than the first, the remainder rounded; prothorax transverse, rounded at the sides, rather coarsely punctured; scutellum round, placed in a triangular depression of the elytra; these rather depressed, slightly rounded at the sides, the apex acuminate, seriate-punctate, punctures approximate, largely impressed, the intervals convex; body beneath and legs pitchy-black; tibiæ slightly bisinuate.

The apex of each elytron is acuminate, without being prominent; the spots are confined to the sides, and are less numerous in a specimen I have, ticketed "Amazon." I have named it after M. René Oberthür, to whom I owe the specimen here described.

Hilipus phrynodes.

H. validus, late ovatus, niger, griseo-squamosus; rostro elongato, subtiliter punctato; elytris convexis, subcordatis, tuberculis majoribus minoribusque adspersus, apice singulatim acuminato. Long. 7 lin.

Hab. Chontales.

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Stout, broadly ovate, black, closely covered, except the tubercles, with minute greyish or greyish-yellow scales; rostrum much longer than the prothorax, minutely punctured; antennæ pitchy; funicle elongate, second joint twice as long as the first, the third and fourth gradually shorter, the next two round, the last triangular; club not longer than the first two joints of the funicle together; prothorax transverse, rounded at the sides, slightly narrower at the base, the apex smooth, the disc with scattered glossy black granules, at the side the granules smaller and less scattered; scutellum triangular; elytra subcordate, convex, conspicuously broader than the prothorax at the base, the apex of each acuminate, apical callus prominent, each elytron in th middle with two principal rows of conical tubercles—about five in each—and a few mostly smaller ones along the sutural margin and at the sides; body beneath pitchy black, with few scales.

There are several species of *Hilipus* having the facies of this, but most of them have the apex of the elytra rounded. *H. prodigialis*, an exception, has the rostrum striate, narrower elytra, nearly parallel at the sides, differently tuberculate, and with a velvety brown patch on each behind the middle.

Hilipus arrogans. (Pl. XVII., fig. 6).

H. validus, late ovatus, fuscus, griseo-squamosus; capite inter oculos longitudinaliter impresso; rostro elongato, confertim punctato; elytris tuberculatis, apice subacuminatis. Long. 8 lin.

Hab. Brazil.

Stout, broadly ovate, brown, with greyish scales; head longitudinally grooved between the eyes; rostrum elongate, scarcely curved, closely punctured; antennæ ferruginous; second joint of the funicle twice as long as the second, and as long as the next three together; club moderately long; prothorax transverse, the sides well-rounded, and a little narrowed at the base, the disc pale greyish, with two rows of small opaque granules in the middle, the sides beneath also granulate; scutellum oblong; elytra convex, much broader than the prothorax, the sides nearly parallel, the apex subacuminate, seriate-punctate, punctures minute, each with a grey scale, the middle of each elytron with two rows—the inner with four, the outer with five—conical tubercles, and with smaller tubercles near the suture and at the sides, all very glossy black, basal two-thirds of the elytra brown, the apical third pale greyish; body beneath and legs dull blackish brown with remote minute

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scales; tarsi covered with long grey hairs, the basal joint somewhat elongate; anterior coxæ separated.

This species has a certain resemblance to *H. Dahlbomi*, but the elytra are much more convex, tuberculate, and the apex not nearly so pointed. The longitudinal groove between the eyes is peculiar. Of course it may be expected that the tubercles will vary from this—the only specimen I have seen.

Hilipus designatus. (Pl. XVI., fig. 7).

H. elongatus, rufo-piceus, prothorace utrinque vitta, elytrisque plagis duabus obscure albido-squamosis ornatis; capite pedibusque rufis. Long. 6 lin.

Hab. New Granada.

Elongate, reddish-pitchy, the prothorax with a stripe on each side, and the elytra with four large patches of short pale yellowish scales; eyes ovate; rostrum moderately slender, thicker towards the apex, the base with three slightly elevated lines, the intervals irregularly punctured; antennæ pitchy; first joint of the funicle longest, the four next rounded, the last transverse and closely contiguous to the club; prothorax longer than broad, rounded at the sides, scarcely narrowed at the base, the disk coarsely punctured, a glossy raised line anteriorly; scutellum elongate, smooth; elytra broader than the prothorax at the base, gradually narrowed to the well-rounded apex, seriate-punctate, a large irregular patch extending from the shoulder to the middle, and another, shorter, meeting its fellow, at the apex; body beneath and legs reddish-pitchy, with few scales; tibiæ rather short, nearly entire.

A narrow form like *H. tetanicus*, but, *inter alia*, with shorter elytra gradually narrowing to the apex, and not depressed in the middle.

Hilipus cornix. (Pl. XVII., fig. 4).

H. oblongo-ovatus, niger, subnitidus, elytris plagis quatuor silaceo-squamosis, munitus; rostro subtenue, glabro, subtiliter punctato; antennis piceis; clava parva; prothorace rude punctato. Long. 7 lin.

Hab. Santa Martha.

Oblong-ovate, black, slightly shining, elytra with four silaceous spots; rostrum rather slender, nearly straight, smooth, minutely punctured; antennæ pitchy; two basal joints of the funicle short, the first the longest, third joint only a little shorter than the

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second; the club shortly ovate; prothorax transverse, rounded at the sides, the base narrowed, coarsely punctured, the intervals between the punctures oblique towards the base; scutellum scutiform; elytra flattish at the base, broader than the prothorax, slightly rounded at the sides, the apex well-rounded, coarsely striate-punctate, punctures approximate, a patch of pale silaceous scales on the shoulder, a similar patch, but more transverse and nearly meeting its fellow at the suture, equidistant between the middle and the apex; body beneath and legs smooth glossy black; tibiæ short, very slightly curved, bisinuate on the inner margin.

A black, robust species with four well-marked silaceous patches on the elytra; the basal joints of the funicle are unusually short. It has the facies of *H. subfasciatus*, a Chilian species, but with, *inter alia*, a much broader prothorax, differently sculptured.

Explanation of Plates XVI. & XVII.

PLATE XVI.

Fig. 1. *Hilipus latipennis.*
2. ,, *tetraspilotus.*
3. ,, *angusticollis.*
4. ,, *basiliscus.*
5. ,, *pardalis.*
6. ,, *validus.*
7. ,, *designatus.*
8. ,, *Fryi*, var.

PLATE XVII.

Fig. 1. *Hilipus fimbriatus.*
2. ,, *ocularis.*
3. ,, *excultus.*
4. ,, *cornix.*
5. ,, *frontalis.*
6. ,, *arrogans.*
7. ,, *arcturus.*
8. ,, *ludiosus.*

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PROCEEDINGS

OF THE

ENTOMOLOGICAL SOCIETY

OF

LONDON

FOR THE YEAR 1889.

February 6, 1889.

The Rt. Hon. LORD WALSINGHAM M.A., F.R.S., President in the chair.

Donations to the Library were announced and thanks voted to the respective donors.

Nomination of Vice-Presidents.

The President announced that he had nominated Mr. H. J. Elwes, F.L.S., Mr. F. Du Cane Godman, M.A., F.R.S., and Dr. D. Sharp, F.L.S., Vice-Presidents for the Session 1889-90.

Election of Fellows.

The Rev. F. D. Morrice, M.A., of Rugby; Mr. A. Robinson, B.A., of Brettenby Manor, near Darlington; and Mr. H. Burns, of Fulham, S.W., were elected fellows.

Exhibitions, &c.

Lord Walsingham exhibited a larva of *Lophostethus dumolini*, Guer., sent to him by Mr. Gilbert Carter, from Bathurst, West Coast of Africa.

Mr. G. T. Porritt exhibited several melanic specimens of *Boarmia repandata* from Huddersfield, and, for comparison,

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two specimens from the Hebrides. Mr. M'Lachlan remarked that melanism appeared to be more prevalent in Yorkshire and the north midlands than in the more northern latitudes of the United Kingdom.

Papers read.

Mr. H. J. Elwes read a paper "On the genus *Erebia*, and its geographical distribution." He said that a revision of the genus had become desirable on account of the numerous recent discoveries in Central Asia and elsewhere; that after studying a very large number of specimens both in his own collection, and in others in Europe and America, he had come to the conclusion that though some of the varieties defined and recognised in Staudinger's Catalogue were inconstant, yet that in the main this classification was far more accurate and trustworthy than that of any other author, and that the revision of *Erebia* by von Gumppenberg published in the last number of the 'Stettiner Entomologische Zeitung' was neither complete nor accurate. He suggested that a better system of classification might perhaps be arrived at by an anatomical investigation of the clasping organs. The author then gave a sketch of the very remarkable geographical distribution of the genus in Europe, Asia, and America, pointing out on the map the habitat of many of the most remarkable species. He observed that it was curious that there was no species peculiar to the Caucasus, and that in the Himalayas and the Himalo-Chinese subregion the genus is replaced by *Callerebia*. *Erebia* is also absent in the Eastern United States of America, whilst in Colorado and the Rocky Mountains the few species found are identical with, or very similar to, European species.

Mr. Elwes concluded the paper by a severe criticism of Mr. A. G. Butler's views on this genus as illustrated in his catalogue of the *Satyridæ* in the British Museum, and more recently in his re-arrangement of the collection there. He stated that the valuable and accurately named collection of Zeller had been so dealt with, that, in his opinion, much of its value was at present lost, owing to the fact that many of the specimens had been removed from their proper places and

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mixed up with other species in such a way, that no one who was not thoroughly acquainted with the genus could understand what they were.

Lord Walsingham reviewed Mr. Elwes' paper in detail. He remarked that the larvæ of the different species of the *Satyridæ* were very similar, and difficult to distinguish, and that this difficulty was increased by the fact that they were all night-feeders. With reference to Mr. Elwes' observations as to the form of the claspers not being constant in species, Lord Walsingham said that so far as he was able to judge by having worked out this character in one small group of genera, he should say it was fairly constant; indeed, he thought the case analagous to that of the mechanical arrangement of a lock and key. With regard to Mr. Elwes' remarks on the subject of the Zeller collection, the President observed that old labels ought always to be retained, and he could not believe that any had been removed in this instance.

Dr. Sharp remarked that he had devised a system for the preservation of the value of such collections as that of Zeller, and yet permitting their incorporation with a general collection. The collection to be incorporated should first be gone through, and the specimens numbered consecutively from beginning to end, "coll. Zeller 1," "coll. Zeller 2," and so on; when this was completed the labels under which the collection was arranged should be removed one by one and pasted into a book entitled "Coll. Zeller," and as this was done the numbers of the specimens that stood under each label should be entered into the book in which the labels were pasted. After this was accomplished the specimens might be re-arranged completely, and yet the position any particular specimen occupied in the original collection could at any time be ascertained by referring to the number on the label and comparing it with the Zeller book. He had carried this out in the case of Dejean's Collection of Lamellicorns and *Dytiscidæ*, and could say that it gave but little trouble, which was well repaid by the preservation intact of the traditional value of the collection.

Mr. M'Lachlan said he was much opposed to the incorporation of typical collections of any Order into the

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general collection of the British Museum. He considered that the feeling that the labours of a lifetime might practically lose their value through incorporation by an incompent hand, would act as a deterrent to many specialists, who, but for this feeling, might desire that their collections should find a resting place in the Museum.

Mr. Waterhouse stated that Mr. Elwes was in error if he supposed that any labels had been removed from the specimens in the Zeller Collection.

Mr. O. Janson said he could confirm Mr. Waterhouse's statement.

Mr. W. Warren read a paper "On the *Pyralidina* collected in 1874 and 1875 by Dr. J. W. H. Trail in the Basin of the Amazons."

Mr. C. J. Gahan read a paper entitled "Descriptions of new or little-known species of *Glenea* in the Collection of the British Museum."

Mr. J. S. Baly communicated a paper entitled "Notes on *Aulacophora* and allied genera."

March 6, 1889.

The Rt. Hon. Lord Walsingham, M.A., F.R.S., President, in the chair.

Donations to the Library were announced, and thanks voted to the respective donors.

Election of Fellows.

The Rev. W. F. Johnson, M.A., of Armagh; the Rev. C. F. Thornewill, M.A., of Burton-on-Trent; and Mr. C. R. Straton, F.R.C.S., of Wilton, were elected Fellows.

Exhibitions, &c.

Mr. F. P. Pascoe exhibited several specimens of the Saüba Ant (*Œcodoma cephalotes*), from Parà, with portions of dried leaves attached to their bodies. It seemed questionable whether the leaves were collected by the Ants for the purpose

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of making their nests or for the sake of some fungus which might be growing on them.

Mr. Jenner Weir exhibited specimens of *Tirumala petiverana* from Mombaza, Eastern Africa; these appeared to be identical with those usually received from Western Africa, and agreed perfectly with the figure in Doubleday & Hewitson's Diurn. Lep., pl. 12, f. 1. He remarked that Petiver's figure, Gazoph. (1, pl. 20, f. 2), differed from all that he had seen, either from Eastern or Western Africa, in having two well-defined elongated basal spots in the fore wing, instead of an upper one only; in this respect Petiver's insect agreed with *Tirumala limniace* of India, but Petiver distinctly states that his specimen came from "Cape Coast, in Guinea." Mr. Moore, in his monograph of the *Limnaina* and *Euplœina* (P. Z. S., 1883, p. 230), gives *Danais leonora*, of Butler, as a synonym of *Tirumala petiverana;* but a reference to the 'Lepidoptera Exotica,' p. 53, pl. 20, f. 2, will show that Mr. Butler's figure differs from that of Doubleday & Hewitson in the pattern of the spots on the upper wing; the most important difference being in the oblique bar of white spots beyond the cell. In Doubleday & Hewitson's figure there is a lower fourth large white spot, but in Butler's figure this spot is absent, or, in other words, the submarginal row of spots has the fourth from the inner edge of the wing missing. Mr. Jenner Weir also observed that it was very unusual in the genus for this spot to be absent; it is obsolete or even absent in *Tirumala tumanana*, Semper, from the Philippines, but in that case the whole of this infra-subapical series of spots is nearly obsolete. Mr. Jenner Weir called attention to these discrepancies, because he thought it probable that the genus *Tirumala*, which is represented by some seventeen or eighteen species in India and Australia, may have more than one species in Africa; indeed, that allied species, *Danais formosa* of Godman (P. Z. S., 1880, p. 183, pl. 19), (the type of Mr. Moore's genus *Melinda*), from the Zanzibar district, tended to give some support to this view, this species appearing to combine in one insect the coloration both of *Limnas* and *Tirumala;* and it was quite possible that some other connecting forms between these two genera might be found to exist.

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Mr. J. H. Durrant exhibited a living larva of *Cossus ligniperda*, which had entirely lost its ordinary colour, and become first pink and then white. He attributed the change, and subsequent loss, of colour to the fact that it had been deprived of its natural food, and fed for eighteen months on pink paper, with which the box in which it was kept was lined, and subsequently on white cardboard.

Mr. M'Lachlan remarked that the most extraordinary peculiarity about this larva, in addition to the loss of colour, was the absence of the usual odour of *Cossus*.

Lord Walsingham observed that it was questionable whether the colours of larvæ were dependent on the colours of their surroundings, or whether they were affected by the contents of the intestinal canal.

Prof. Meldola said that the caterpillar exhibited, having eaten the pink paper with which the box was lined, had most probably become dyed by the colouring-matter, and he did not think that the observation had much bearing on the question of the protective colouring of caterpillars. It was well known to physiologists that certain dye-stuffs could be introduced into the tissues of animals by mixing the colouring-matters with the food, and paper was frequently stained with soluble coal-tar dyes, such as eosin, magenta, &c., so that it was simply a case of direct dyeing of the larva. The whole question of the direct influence of the colour of the food-plant upon the colour of the larva had been thoroughly discussed by himself in the notes to his translation of Weismann's 'Studies in the Theory of Descent,' and many experiments in this direction had since been carried out by Mr. E. B. Poulton, whose results showed most conclusively that in the larvæ forming the subjects of his experiments no such direct coloration by the colouring-matter of the plant occurred. Mr. Poulton's experiments had been fully described in papers published in the 'Transactions' of the Society and elsewhere, and he (the speaker) did not think it necessary to do more than to remind Mr. Durrant of their general bearing. It was not impossible that in the case of certain species feeding upon flowers, or upon the leaves of plants containing highly-coloured juices, some such power of direct coloration leading to protective

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adaptation had been acquired by the agency of natural selection, but even in these cases no experimental work had as yet been carried out in a satisfactory manner. He (Prof. Meldola) had suggested many years ago that the green colour of caterpillars had been brought about in this way by the action of natural selection; the faculty of assimilating the chlorophyll of the plant having been acquired under the influence of this agency. This suggestion was converted into an established fact by Mr. Poulton's observations, chlorophyll in a modified form having been detected in the blood of leaf-feeding larvæ (Proc. Roy. Soc., 1885, pp. 269–315).

Mr. W. White remarked that he thought there was rarely any direct relation between the colour of food and the larval skin-coloration, although it was the case with most subterranean and internal feeders, which were generally more or less transparent. It was evident that different food-plants did not produce the divergence in colour common amongst the *Noctuæ* from the fact that the dimorphic brown and green forms of the *Hadenidæ* larvæ were to be met with upon the same plant, as he had frequently noticed; and he had found extreme types in the case of both *H. pisi* and *Euplexia lucipara* feeding upon the same fern-frond. The case is similar with *Mamestra brassicæ*, and probably all the other species subject to this variation. On the other hand, as had already been pointed out by Prof. Meldola, the colour of the leaves as an environment had been conclusively proved by experiment to be productive of variation in colour. It would be remembered that Mr. Poulton had tested this very point with *Smerinthus* larvæ, and found that those which were fed upon a species of sallow, having a silvery underside to the leaves, which only was seen by the larvæ,—each leaf being folded and sewn,—became unusually pale in consequence, while others from the same stock, which were subjected to the normal appearance of the same leaves, remained of the more usual yellowish-green colour, the pabulum being the same, of course, in both cases.

Mr. B. A. Bower exhibited a specimen of *Parasia neuropterella*, Z., bred from heads of *Centaurea scabiosa*, and said he believed the species had not been previously bred. He also

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exhibited series of *Coleophora olivaceella*, Stn., *C. solitariella*, Z., and *Laverna subbistrigella*, Hw. The President remarked on the beautiful condition and setting of the specimens.

Mr. White exhibited a series of male and female specimens of *Orgyia thyalina*, belonging to Mr. Leech, and obtained by the late Mr. H. J. S. Pryer in Japan. Some of the females had their wings fully developed, and some of them were semi-apterous, as is usual with the females of this genus. Mr. White remarked that he believed that in every known species of *Orgyia*, in Europe, N. America, and elsewhere, the female is subapterous; but in this species it appeared that some of the females were subapterous, and some had the wings developed amply, without there being any intermediate forms. The specimens exhibited included three males and five females —of which latter two were apterous and three fully winged. Mr. White thought that it was most important that some observer in Japan should make a point of rearing the species from the egg to test the accuracy of the identification.

Prof. Meldola asked whether Mr. Leech was sure there was no mistake in the identity of the individuals; the case was the most remarkable of the kind he had ever heard of.

Mr. R. South replied that Mr. Leech did not know for certain, but the markings on the minute wings of the sub-apterous specimens were so very similar to those of the winged females as to suggest that, if duly developed, they would be quite identical. He believed that someone in Japan had promised to undertake to rear the species.

Lord Walsingham exhibited specimens of preserved larvæ of *Eupithecia extensaria*, from King's Lynn, Norfolk; also a preserved larva of *Smerinthus ocellatus* and one of *Sphinx ligustri*. The larva of the last-named species was a variety, and the President remarked that it was the only one of this species he had ever seen.

Mr. H. J. Elwes said that, from communications which had been made to him, it appeared that certain remarks of his at the previous meeting, on the Zeller collection in the British Museum, had been misunderstood. He had no intention of accusing any one of removing labels from this collection, and he regretted that he had not expressed himself more clearly.

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The Secretary read a communication from the Rev. Dr. Walker, announcing his intention of making an expedition to Iceland this year, from the 23rd June to the 29th July, and asking that any entomologists who might wish to accompany him would send him their names.

Mr. Distant proposed that the Society should pass a resolution expressing regret at the death of the Rev. J. G. Wood.

Paper read.

Mr. Gervase F. Mathew, R.N., communicated a paper entitled "Descriptions and Life-Histories of new species of Rhopalocera from the Western Pacific."

April 3, 1889.

F. Du Cane Godman, Esq., M.A., F.R.S., Vice-President, in the chair.

Donations to the Library were announced, and thanks voted to the respective donors.

Election of Fellows.

Mr. A Cant, of 98, Robert Street, Regent's Park, N.W.; Mr. C. Cave, of 13, Lowndes Square, S.W.; Mr. N. F. Dobrée, of The New Walk, Beverley; Mr. J. Harrison, of Gawber Road, Barnsley; Mr. S. L. Mosley, of Beaumont Park, Huddersfield; and Mr. B. G. Nevinson, M.A., F.Z.S., of 6, Tite Street, Chelsea, S.W., were elected Fellows.

Exhibitions, &c.

Mr. Osbert Salvin exhibited specimens of *Ornithoptera trojana*, Staud., and *O. plateni*, Staud., received from Dr. Staudinger, and obtained in Palawan, an island between Borneo and the Philippines. He remarked that *Ornithoptera trojana* was allied to *O. brookiana*, Wall.

Mr. R. M'Lachlan exhibited, and made remarks on, seven examples of *Æschna borealis*, Zett., a little-known species of European Dragonflies. He said that some of the specimens

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were captured by himself at Rannoch, Scotland, in June, 1865, when he was accompanied by Dr. Sharp and the late Mr. E. C. Rye. The other specimens were taken in Luleå, North Sweden, and the Upper Engadine (5000–6000 ft.) in Switzerland.

Mr. W. H. B. Fletcher exhibited specimens of *Agrotis pyrophila* from various localities, including two from Portland, three from Forres of a smaller and darker form taken by Mr. Salvage last year, and a melanic specimen from Stornoway at first supposed to belong to *A. lucernea*, but which, on closer examination, was seen to be referable to this species. He also exhibited series of *Triphæna orbona* from Stornoway and Forres, and *T. subsequa* from Forres and the New Forest. The specimens of *T. subsequa* from Forres were more distinctly and richly marked than those from the New Forest, and were also rather more variable in colour.

Dr. Sharp exhibited specimens of *Proculus goryi*, Kaup, found by Mr. Champion in Guatemala, prepared to show the rudimentary wings under the soldered elytra. Dr. Sharp called attention to the existence of a peculiar articulated papilla at the base of one of the mandibles; and he also showed sections of the head of *Neleus interruptus* displaying this *papilla*, as well as the articulated teeth on the mandibles.

The Rev. Canon Fowler exhibited specimens of *Agapanthia lineatocollis*, Don, and remarked that they were able to produce a distinct stridulation by the movement of the head against the prothorax, and of the hinder part of the prothorax against the mesothorax; they were also able to produce an unpleasant scent. He further remarked that Dr. Chapman had lately informed him that *Erirrhinus maculatus*, F., had the power of stridulating strongly developed. He also exhibited a specimen of *Barynotus*, taken in Norfolk, which was apparently an abnormal example of *B. obscurus*.

Mr. Edward Saunders exhibited, on behalf of Mr. G. A. J. Rothney, in illustration of his paper on Indian Ants, specimens of the following: *Camponotus compressus* and fragments of *Solenopsis geminatus* destroyed by it; *Camponotus* sp.?, with a mimicking spider (*Salticus* sp.); *Pseudomyrma bicolor*, with its mimicking *Salticus*, and a new species of *Rhinopsis*, viz.,

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ruficornis, Cameron, also found with it, and closely resembling its host; *Diacamma vagans*; *Holcomyrmex indicus*, with specimens of the grain which it stores and the chaff which it rejects; and *Aphænogaster* sp., with the pieces of *Mimosa*, &c., with which it covers its nest.

Papers read.

Mr. G. A. J. Rothney communicated a paper entitled "Notes on Indian Ants."

Mr. Lionel de Nicéville communicated a paper entitled "Notes regarding *Delias sanaca*, Moore, a Western Himalayan Butterfly."

Mr. H. J. Elwes communicated a note in support of the views expressed by Mr. de Nicéville in his paper.

May 1, 1889.

F. Du Cane Godman, Esq., M.A., F.R.S., Vice-President, in the chair.

Donations to the Library were announced and thanks voted to the respective donors.

Election of Fellows.

Mr. Walter F. H. Blandford, B.A., of Trinity College, Cambridge, and 48, Wimpole Street, W., and Mr. John W. Downing, of 59, Lupus Street, St. George's Square, S.W., were elected Fellows.

Death of a Fellow.

Mr. W. L. Distant announced the death of Dr. Signoret, of Paris, one of the Honorary Fellows of the Society.

Exhibitions, &c.

Dr. Sharp exhibited male and female specimens of an abnormal form of *Rhomborhina japonica*, found in Japan by Mr. G. Lewis. They exhibited a contraction of the thorax, which was much narrower than usual at the base, so that the

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mesothoracic epimera were entirely exposed. Dr. Sharp also exhibited a small collection of Coleoptera made by Dr. Neville Manders in the Shan States, Upper Burmah; this collection contained several new interesting forms, the most remarkable being a small heteromerous insect bearing a considerable resemblance to *Rhysodes*. Amongst the specimens was an example of *Batocera roylei*, which he had retained in a relaxed condition, so that the Fellows might have an opportunity of hearing its stridulation: this was produced in a very audible manner by passing the base of the prothorax backwards and forwards over a striated space at the base of the scutellum.

Mr. C. O. Waterhouse exhibited, for Mr. Frohawk, a series of wings of British Butterflies, prepared in accordance with a process (described by Mr. Waterhouse in the Proc. Ent. Soc. 1887, p. xxiii), by which they were denuded of their scales so as to expose the neuration.

Dr. P. B. Mason exhibited cocoons of a species of spider,—*Theridion pallens*, Black.,—from Cannock Chase, distinguished by the presence of large blunt processes on their surface.

Mr. H. Goss exhibited, for Mr. N. F. Dobrée, a number of scales of *Coccidæ*, picked off *Acacia melanoxylon* and *Grevillea robusta*, imported Australian plants, growing in the Market Square, Natal. These scales had been referred to Mr. J. W. Douglas, from whom the following letter had been received:—

"8, Beaufort Gardens, Lewisham,
"April 11th, 1889.

"Dear Mr. Goss,—I return herewith the scales that you sent to Mr. M'Lachlan, which he forwarded to me. The scales being empty, that is, without the insects that made them, it is difficult to form an idea of what they are, but, as far as I am able to judge, they, *i. e.*, the insects, are *Coccidæ*, fam. *Brachyscelidæ*, probably genus *Brachyscelis*, Schrader. Several species were described in the 'Trans. (Ent.) Linn. Soc. N. S. Wales,' i. (1863), and also in 'Verhandl. zool.-bot. Gesells. Wien' (1863), with figures. Signoret, in his 'Essai s. l. Cochenilles' (Ann. Soc. ent. de France, 5 ser., v., p. 591, pl. 10), has given notes of Schrader's insects, and figures of some of them, but not of the scales. I gain my information

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from Signoret only. Most of the species are mentioned as living on *Eucalyptus*, whereas these from Natal come from *Acacia* and *Grevillea*, both Australasian trees, so that, although the food plants are not the same, the insects probably came from Australia on the plants on which they were found, and may or may not be special to them. This, I think, is all I can do towards identification, and no one can do more in the matter unless he has by chance in his possession similar scales which have been identified. Possibly some Australian entomologist, say, in Sydney, could say something more definite from personal, local knowledge. The family is very peculiar and interesting, and so I have ventured to keep two of the scales. I shall be very glad to have any further information, if it should be forthcoming.

"Yours very truly,
"J. W. Douglas."

Mr. H. J. Elwes exhibited a large number of specimens of *Terias* of the *hecabe* group, in order to show the amount of seasonal and local variation which existed. He stated that these variations had been a constant puzzle to lepidopterists, and that the number of forms which had been described was so great that many of them were impossible to distinguish or identify. In the British Museum Collection the *hecabe* group was represented by no less than 35 so-called species from the Indian region alone, of which 12 or 13 were described by Butler, and 10 by Moore. But when a large number were arranged as he had here placed them, according to the season of their capture, it would be seen that there was good reason to believe that many of these forms were seasonal. In localities where the difference of heat and moisture between the winter and summer was great, as in the Himalayas, Punjab, Deccan, China, Liu-kiu Islands, and to a less extent in the highlands of Ceylon and Southern India, the winter brood of *T. hecabe* appearing between December and March, together with some of those taken in October and November, is marked by a diminution or absence of the black border on the hind wings, and the presence of more or less conspicuous chocolate markings below, whilst in the same localities the summer and autumn broods had almost without exception broader

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black borders, and little or no chocolate markings beneath. In purely tropical localities, where the difference of climate in the seasons was not so marked, the different broods also appeared to be less different from each other; and in some of the Malay Islands, such as the Nicobars, there seemed to be forms which were worthy of specific separation, though not to anything like the extent to which it had been carried. In Japan, *Terias* had been to some extent bred from the egg, and the opinion of the late Mr. Pryer, of Mr. Leech, and of all others, so far as he knew, who had local knowledge, was in favour of the identity of the various forms which Mr. Butler had figured in the Transactions of this Society some years ago, whilst the opponents of the seasonal and local variation theory had, as far as he could see, not brought forward one word of evidence in their favour. Mr. Elwes concluded by expressing a hope that collectors in the East, of whom some were present on this occasion, would recognize the importance of deciding these questions before they added to the intolerable synonymy which now existed, and which was only calculated to disgust students, without enlightening them.

Mr. G. F. Hampson afterwards stated that during seven years' collecting in the Nilgiri Hills he had paid considerable attention to the *hecabe* group of *Terias*, and had repeatedly taken males and females with or without the chocolate markings at all seasons of the year. He had come to the conclusion that the forms of this group are extremely variable, that the chocolate markings count for nothing whatever, and that in the Nilgiris there may possibly be three species of the *hecabe* group, *viz.* (1) a small form with narrow borders, as *hecabe*, *purrea;* (2) a larger form with broad borders, as *hecabeoides*, *excavata;* and (3) a form with the border narrow at the outer angle, and the red patch covering the whole apex of the fore wing below, as *uniformis*, *silhetana*. Mr. Hampson also states that on the Nilgiris, which is a region of heavy rainfall (on the western extremity 200 in. or more), he never takes the forms with no chocolate markings whatever, which occur in the arid and almost desert region of Sind. Mr. W. L. Distant, Mr. F. D. Godman, Prof. Meldola, Mr. H. T.

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Stainton, and Mr. G. Lewis took part in the discussion which ensued.

Mr. W. Dannatt exhibited specimens of *Thaumantis Howqua*, West, from Shanghai.

Mr. H. Burns exhibited, and made remarks on, a number of nests of living ants of the following species, viz., *Formica fusca*, *Lasius alienus*, *L. flavus*, *L. niger*, *Myrmica ruginodis*, *M. scabrinodis*, &c. One of the nests contained a queen of *L. flavus* which had been in the exhibitor's possession since September, 1882.

Papers, &c., read.

Mr. G. C. Bignell communicated the following paper, entitled "Description of a new species of British *Ichneumonidæ*":—

PIMPLA RUFIPLEURA, n. sp. — Head smooth and shining; antennæ of female as long as from scutellum to the end of abdominal segments; antennæ of male a little shorter; thorax smooth and shining, with scattered punctures; abdomen about twice the length of the head and thorax, almost cylindrical; segments almost quadrate, second the longest, covered with coarse punctures; apical margins rather broad, smooth and polished, aculeus one-third the length of the abdomen, as long as segments 2, 3, and 4 combined; transverse anal nervure of hind wing divided in the middle.

Black. Female:—head with narrow line close to the eyes, from vertex to clypeus; clypeus and base of mandibles, and palpi pinkish; a pinkish dash on the scutellum and metanotum, and a line before the wings; pleura rufous; legs tricolor; middle and hind coxæ, trochanters and femora ferruginous; front coxæ much lighter; hind femora, the extreme apex whitish, a black dot on the upper side at the base; front and middle tibiæ and tarsi ferruginous; middle tarsi at the extreme apex fuscous; hind tibiæ, base, and middle whitish; a ring near the base, and the entire apex black; tarsi whitish; extreme apex of joints black. Male:—face, and underside of scape and flagellum pinkish; otherwise like the female. Length 8 mm.

Twenty-three males and females of this unique species were bred 10th April, 1888, from a batch of cocoons kindly sent to

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me by Dr. T. A. Chapman, who obtained them from a larva of *Pygæra curtula*. This batch of cocoons were so like a cluster of *Macrocentrus* cocoons that Mr. Bridgman at first sight could scarcely credit they were those of a *Pimpla*, which, as a rule, are solitary parasites; but fortunately one male died within its cocoon, which I desired Mr. Bridgman to remove, to make certain that I was correct in my observations, which he did, and he is now able to vouch, if necessary, for the accuracy of my statement.

Mr. A. G. Butler communicated the following paper entitled "A few words in reply to Mr. Elwes' statements respecting the incorporation of the Zeller Collection with the General Collection of Lepidoptera in the Natural History Museum."

For the last year or two I have carefully abstained from replying to the observations from time to time made upon my system of working at the Lepidoptera by Mr. H. J. Elwes, considering it better to leave questions respecting the validity of species to be definitely decided at a future time, by those who are in a position to carry out a course of careful breeding, similar to that which has been, and still is being, prosecuted by such indefatigable students as Mr. W. H. Edwards, of the United States.

In our present state of almost total ignorance of the early stages of by far the greater portion of the Lepidoptera, it seems to me to be nothing short of presumption for anyone to claim to be able to decide finally what shall and what shall not be called a species; almost every man holds a different opinion from his fellow, and, although he who has studied longest and most persistently is most likely to be the best judge, the whole question resolves itself into a matter of individual opinion.

I should not now consider it worth while to weary the Entomological Society by disputing with Mr. Elwes touching his and my own opinions on the vexed question of what is a species and what a variety; but the statements which Mr. Elwes made at the meeting of the 6th of February appear to me to affect my character as an Entomologist and my right to the position of trust which I

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hold under Government: I therefore feel bound to say that these statements are inaccurate.

Mr. Elwes has himself withdrawn his more serious charge, and therefore it is unnecessary for me to disprove it. I have, then, only to answer the following statement (Proc. Ent. Soc. p. ii.) :—"He stated that the valuable and accurately named collection of Zeller had been so dealt with that, in his opinion, much of its value was at present lost, owing to the fact that many of the specimens had been removed from their proper places, and mixed up with other species in such a way that no one who was not thoroughly acquainted with the genus could understand what they were."

First, I shall prove that, in spite of its great value, the Zeller collection is by no means always correctly named, even if Staudinger's Catalogue be regarded as a guide.*

As it may surprise the Fellows of the Society that, after the lapse of years, it is possible to reproduce (without the possibility of doubt) the exact nomenclature followed by Zeller, I may still further assure them that the Catalogue of the Collection, prepared by order of the Trustees, not only enables anyone who has access to it to do this, but, if necessary, to re-arrange the labelled specimens of any given species in the order which it pleased Zeller to follow in his cabinets.

To proceed to Zeller's identifications :—

1. *Erebia manto*, Esper, is labelled "*Erebia pyrrha*, S. V.," which, according to Staudinger, is a synonym, and therefore not the correct name.

2. *Erebia stygne*, Ochs., is labelled "*Erebia pyrene*, Esp.," which Staudinger regards as a synonym: this, therefore, is again inaccurate.

3. *Erebia glacialis*, Esp., is labelled "*Erebia alecto*, Hb.," which, according to Staudinger, is an aberration and variety —"ab. et v.": one of the examples I consider to be the female of *F. lefebvrei*, Bdv. (= *maurus*, Esp. = *melas*, Hbst.,

* That it cannot always be a safe one may be taken for granted, since much of it is undoubtedly a mere reprint of the work of other authors (the whole arrangement of the extremely heterogeneous group *Agrotis* is Lederer's).

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sec. Staud.), and there is a note to that effect in the Catalogue: Mr. Elwes thinks that I am wrong; perhaps so, but as the specimen corresponds far more closely with the male of *E. lefebvrei* than with that sex of *E. glacialis*, I prefer to use my private judgment, which has had twenty-five years of close study to mature it: typical *E. glacialis* shows no ocellus on upper surface of primaries, but does show a rufous transverse band; in *E. melas* = *lefebvrei* there is an ocellus, but no rufous band; typical *E. alecto*, which is not an aberration if it is a variety of *E. glacialis*, has both ocellus and rufous band, and was labelled "*E. scipio*": Hübner's typical figure gives four ocelli in both primaries and secondaries, whereas Zeller's *E. alecto* show none in any of the wings.

4. *Erebia scipio*, Bdv., is, in my opinion, nothing more than *E. alecto* with two instead of four ocelli in the male; the female has four ocelli, as in that species; one of Boisduval's figures shows three spots on the upper and two on the under surface: Zeller and Staudinger considered *E. alecto* as a variety of an insect utterly unlike it and *E. scipio*, which is a variable species (as shown even in the typical figures), but differing from *E. alecto* only in the absence of one or two ocelli, as a distinct species: I cannot but question whether they ever compared the typical figures, as I did, both when writing my Catalogue and arranging the collection subsequently.

5. *Erebia æthiops*, Esper, should, according to Staudinger, take priority of *E. medea*, but Zeller labelled his specimens "*Erebia medea*, S. V.," which, according to Staudinger, is a double error: he says that the "*medea*, S. V. and F. S. E., was another butterfly." I admit that Hübner, by figuring *E. æthiops* as *E. medea*, S. V., led me into the same error.

6. *Erebia euryale*, Esp. One of the specimens, corresponding exactly with Esper's figure, was labelled by Zeller as "v. *adyte*," whereas, according to Staudinger, the latter is a variety of *E. liyea*: in my Catalogue I have regarded it as a variety of *E. euryale*, so close as to be unworthy of separate record: if then, as Mr. Elwes says, Zeller's collection is accurately named, I must also be accurate and Staudinger

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inaccurate in this identification. A second specimen is labelled "v. *philomela*," whereas Staudinger regards *E. philomela* as identical with *E. euryale;* and I again agree with Zeller in considering it a well-marked variety.

7. *Erebia lappona*, Esp., is labelled "*Erebia manto*, S. V.," but according to Staudinger the former name should be used, and the name *E. manto*, Esp., used for *E. pyrrha*, S. V.

8. *Erebia tyndarus*, Esp. The variety? *E. hispanica*, Butl., still stands as "v. *nevadensis*, Stdg.," although Staudinger, in his Catalogue, admits the priority of my name.

Therefore, taking Staudinger as a judge, there are no less than seven inaccuracies in Zeller's naming of the genus *Erebia* alone; in other groups the errors, judged by the same standard, are equally numerous.

But if, as in my case, Staudinger is not allowed to be infallible, it is still easy to show that Zeller's identifications are often far from accurate. I will only cite a few instances which have come under my notice during the last few weeks.

A specimen in the Zeller collection, labelled "*Agrotis aquilina*," has white secondaries, and is probably *A. seliginis*, but certainly not *A. aquilina*.

An example labelled "*Agrotis decora*" is the male of *Chera* (*Spælotis*) *nyctimera*, the antennæ of which differ in structure and the wings in width.

An example labelled "*Agrotis christophi*" differs from that species in the structure of its antennæ, its palpi, its unbanded legs, longer wings and pattern, and is probably a variety of, or at most a very closely allied species to, *Ochropleura plecta*.

The "*Agrotis satorum*" of Zeller consists of a male *A. christophi*, and a male of an allied species with serrate-ciliated antennæ.

The "*Pachnobia leucographa*" of both Zeller and Staudinger differs structurally from *Pachnobia*, and should be placed in *Semiophora*, Steph., which would supersede *Tæniocampa*.

Under "*Tæniocampa stabilis*" are two male specimens with closed anal claspers, the antennæ of which are serrated (not pectinated), and which have therefore been mistaken for females, although the female of *T. stabilis* has simple antennæ: they therefore are, strictly speaking, not congeneric

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with the species for which Zeller took them, being in my opinion nothing more nor less than the so-called "*Tæniocampa gracilis*."

I have not examined minutely into Zeller's identification of *Pyrales*, but Mr. Warren recently called my attention to the fact that the type specimen of Zeller's *Phacellura magdalenæ* is labelled as "distinguished from *P. columbiana* by the clear fringes of the hind wings"; he not noticing that his four other examples do not differ at all in this particular, but, on the other hand, that the colouring of the anal tuft is the true distinguishing character.

However, I think it is hardly worth while to proceed further; whatever blunders Zeller made, he was a grand man, and, as a rule, careful: it has been necessary to show that his identifications were no more accurate than those of any other good worker, and this I have done.

Mr. Elwes severely criticised my 'Catalogue of Satyridæ'; I shall therefore proceed to point out in what manner it differs from Staudinger's Catalogue.

1. Under *Erebia arete* I give the synonym *Papilio claudina* of Borkhausen, which Staudinger omits to notice.

2. Under *Erebia pharte* I quote as a variety *E. euryale* of Herrich-Schäffer's fig. 101, whereas Staudinger considers (perhaps rightly) that all Herrich-Schäffer's figures represent the same species.

3. Under *Erebia kefersteinii* I quote *E. theano* as a synonym, but Staudinger considers that both are good species: on the other hand *E. stubbendorfii* is considered by Staudinger to be a synonym of *E. theano*, and I have retained it as a separate species. It must be remembered here that I had never seen examples of any of these forms, and therefore only judged by figures and descriptions.

4. Under *E. melampus* I have quoted *E. cassiope* var. *pyrenaica*, *E. mnestra*, and *E. eriphyle* as varieties, whereas Staudinger gives the first as a variety of *E. epiphron* and the two others as distinct species.

5. I gave *E. pyrrha* priority over *E. manto*, Esper, on the ground that an *Erebia manto* already existed; but, as already stated, Staudinger sinks the latter as a synonym of *E.*

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lappona, and therefore reverses the order of *E. pyrrha* and the *E. manto* of Esper.

6. I kept *E. pluto*, *glacialis* and *alecto* as distinct species, and *nerine* as a variety of the last mentioned; Staudinger considers the first three to be forms of one species and *nerine* as distinct.

7. I gave *E. stygne* as a variety of *E. pirene* of Esper, on the ground that the latter had forty-two years' priority; Staudinger reverses this without giving any reason beyond the fact that Linnæus had described another butterfly under the similar name of *Papilio pyrene*.

8. I gave *E. maurus*, Esper, priority over *E. melas*, Herbst, because Esper's work is dated 1777 and Herbst's 1796; Staudinger reverses the order under the supposition (he gives the date with a query) that Esper's species was described in 1798: in cases of uncertainty surely it is better to take the printed date.

9. Staudinger differs from me in considering the *E. pronoe* of Esper identical with *E. arachne*, whereas I considered it to be *E. neoridas*; he therefore sinks *E. arachne* as a synonym, and quotes no synonyms to *E. neoridas*.

10. As already pointed out, *E. medea* is sunk as a synonym of *E. æthiops*, and, if Staudinger is correct, on sufficient grounds.

11. I regarded *E. stygne*, Fischer, and *E. sedakovii*, H.-Sch., as probable varieties of *E. neoridas*; Staudinger places them as a distinct species next to *E. neoridas*.

12. I placed *E. sedakovii*, Eversm., as a slight variety of *E. ligea*; Staudinger thinks it the same as *E. sedakovii*, H.-Sch.

13. I called *E. eumonia* a variety of *E. ligea*; Staudinger puts it separately with a query, and a doubt whether it is not a variety of *E. ligea*; practically here there is no difference.

14. The synonyms *E. evias* and *bonelli* are reversed by Staudinger, in consequence of information received (subsequent to the publication of my Catalogue) respecting the dates of Hübner's figures.

But it is hardly worth while to continue: differences of

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opinion touching the meaning of published figures, not a few of which are very indifferently executed, must always exist; the species themselves also are, for the most part, so closely related that (as with the genus *Colias*) it is useless to dogmatise as to the limits of their variation: until they are bred, every Lepidopterist must please himself, and try to live in charity with his neighbour who thinks differently.

One thing, however, ought to be borne in mind:—When I wrote my 'Catalogue of Satyridæ' I had only had charge of the Museum butterflies for about three years, my first paper upon them being published in the 'Proceedings of the Zoological Society' for 1865: my experience, therefore, at that time was probably not greater than that of some of my critics.

Even if it were a fact that by incorporating the Zeller collection "many of the specimens" had been "mixed up" with specimens of "species" to which they do not belong,—and this I presume is what Mr. Elwes intended to say,—the injury to the collection would not be permanent, and after all it would not be different from that which has been inflicted upon every collection of exotic Lepidoptera by the very men who claim to know the species of Europe. It would indeed be a light task for any student of exotic species to show that, in Staudinger's brilliantly illustrated work on Exotic Butterflies, not only species, but genera, have been confounded. But, as I have already pointed out, the "mixing up" is a matter of opinion, and I believe I have a right—nay more, that it is my duty—to arrange the Museum collection as nearly as possible correctly, according to my views, not swerving from what I consider to be the straight path on account of adverse criticism.

Mr. Elwes, Mr. Stainton, Mr. Godman, and others took in the discussion which ensued.

June 5, 1889.

The Rt. Hon. Lord Walsingham, M.A., F.R.S., President, in the chair.

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Donations to the Library were announced, and thanks voted to the respective donors.

Election of a Fellow.

Mr. W. M. Christy, of Watergate, Emsworth, was elected a Fellow of the Society.

Exhibitions, &c.

Mr. S. Stevens exhibited a specimen of *Acrolepia assectella*, Zeller, included in a lot of *Tineidæ* purchased by him at the sale of the late Mr. A. F. Sheppard's collection, and determined by Mr. Stainton. He also exhibited, for comparison, a specimen of *A. betuletella*.

Mr. J. J. Walker, R.N., exhibited a collection of Lepidoptera made in 1887 and 1888 in the immediate vicinity of the Straits of Gibraltar. The collection comprised about 100 species of butterflies, of which thirty-six were obtained on the Rock of Gibraltar, and fifty-eight on the European side of the Straits. Five species (*Euchloë eupheno*, L., *Lycæna theophrastus*, F., *Thestor mauritanicus*, Luc., *Cœnonympha arcanioides*, Pierr., and an unnamed species of *Pamphila* allied to *P. nostradamus*, F.) were observed only in Marocco; while *Papilio podalirius*, L., *Euchloë tagis*, var. *bellezina*, Bdv., and *Pararge mæra*, L., were found at Malaga. The dark form of *Thais rumina*, L., was observed only on Peregil Island, under Apes Hill, on the African side, and the var. *latteri* of *Papilio podalirius* at Tangier and Benzús Bay, Marocco. About 160 species of moths were exhibited, the most remarkable being *Paranthrene tineiformis*, Esp., *Sesia ramburi*, Stgr., *Orgyia trigotephras*, L., *Megasoma repandum*, Hub. (bred from the ova), *Raphia hybris*, Hub., *Plusia chalcites*, Esp., *Polia canescens*, Dup., *Catocala dilecta*, Hub. (bred), *Anthometra plumularia*, Bdv., and *Sterrha consecraria*, Rbr.

Dr. P. B. Mason exhibited a number of specimens of a South-European species of Ant—*Crematogaster scutellaris*, Oliv. He said that the specimens were all taken in the fernery of Mr. Baxter, of Burton-on-Trent, and had probably been imported with cork.

Mr. O. E. Janson exhibited a pair of *Neptunides stanleyi*, a

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species of *Cetoniidæ*, recently received from Central Africa, and described by him in the February number of 'The Entomologist'; also some varieties of *N. polychrous*, Thoms., from the Zanzibar district.

Dr. N. Manders exhibited a number of Lepidoptera collected by himself in the Shan States, Upper Burmah; also a collection of Lepidoptera made by Captain Raikes in Kárenni.

Mr. M'Lachlan exhibited over 400 specimens of Neuroptera, being a portion of the collection formed in Japan by Mr. H. J. S. Pryer. They represented nearly all groups (excepting *Odonata*, now in the hands of Baron De Selys). Some of the *Ascalaphidæ*, *Panorpidæ*, and especially *Trichoptera*, were of great beauty; notably amongst the latter was the curious moth-like genus *Perissoneura*, M'Lach.

Dr. Sharp exhibited the peculiar cocoons of an Indian moth, *Rhodia newara*, Moore; these were the cocoons possessing a drain at the bottom in order to allow water to escape, already described in the 'Proceedings of the Zoological Society' for 1888, p. 120, where, however, their great resemblance to the pods of a plant had not been alluded to.

Mr. Enock exhibited, and made remarks on, specimens of *Cecidomyia destructor*, bred from American wheat.

Mr. W. Warren exhibited a bred specimen of *Retinia posticana*, Zett., from Newmarket; also specimens of *Eupithecia jasioneata* and *Gelechia confinis*, bred by Mr. Gardner, of Hartlepool.

Mr. C. O. Waterhouse exhibited and explained a number of diagrams illustrative of the external characters of the eyes of insects. He observed that the simplest form of primary eye is that of an *Eciton;* the simplest form of compound eye yet known is that of a Brazilian *Lathridius* with seven unequal-sized facets; between that and the eye of *Sphinx convolvuli* (in which there are 27,000 facets), probably every number may be met with. In several handbooks 34,000 facets are given as occurring in a *Papilio*, but this is an error; this number refers to the two eyes, each having 17,000. The eyes are subject to various interruptions, the most common being by an encroachment of the ocular canthus, which in some cases completely divides the eye,

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as in some genera of Stagbeetles (*Odontolabis*). A somewhat similar interruption occurs in *Dineutes*. The facets in the lower part of the eye are a trifle larger than in the upper part (about 9 to 10). In many insects the reverse is the case, the upper facets being larger than the lower, a notable case being *Anax*. The lenses are circular in most cases where they are very convex, as in *Lathridius* and *Batocera*. When hexagonal they are often very irregular (the diagrams exhibited showed parts of the eye of *Hydrous* and *Sphinx*). The convexity of the lenses varies very greatly; when they are very convex the eye has a granular appearance, but when not greater than the convexity of the eye itself, the eye appears perfectly smooth (*Bolbocerus*, &c.). The intervening lines between the lenses are often beset with hairs, sometimes very long and dense, as in the male honey-bee and *Trichophthalmus;* and the modification of the hairs into scales which takes place on the body takes place on the eyes also, the scales on the eyes of some beetles of the family *Colydiidæ* being very large, arranged in lines over the eye like tombstones (*Trachypholis*). The eyes are placed on the top of the head in *Eciton* and some other ants. A discussion ensued, in which Mr. M'Lachlan, Mr. Verrall, Lord Walsingham, Mr. Jacoby, Mr. Kirby, and others took part.

Papers read.

Mr. A. G. Butler communicated a paper entitled "Descriptions of some new Lepidoptera-Heterocera in the collection of the Honble. Walter de Rothschild."

Mr. Butler also contributed a second paper entitled "Synonymic Notes on the Moths of the earlier genera of Noctuites."

Dr. Sharp read a paper entitled "An Account of Prof. Plateau's Experiments on the Vision of Insects."

Lord Walsingham, Mr. Jacoby, Mr. White, and Mr. Waterhouse took part in the discussion which ensued.

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July 8, 1889.

The Right Hon. Lord WALSINGHAM, M.A., F.R.S., President, in the chair.

Donations to the Library were announced, and thanks voted to the respective donors.

Election of Fellows.

The Rev. W. A. Hamilton, of Calcutta, and Mr. H. W. Vivian of Glenafon, Taiback, South Wales, were elected Fellows of the Society.

Exhibitions, &c.

The Rev. Canon Fowler read the following letter from Mr. E. T. Atkinson, Chairman of the Trustees of the Indian Museum, Calcutta :—

Indian Museum, Calcutta,
25th April, 1889.

Sir,—As Chairman of the Trustees of the Indian Museum, I write to ask for the assistance of your Society in the following matter.

To enable Entomology to be studied systematically in India, where as yet but very little is known, it is essential that the numerous practical working entomologists, of this country, should have access to some large and scientifically named and arranged collection of Indian insects. This want the Indian Museum has set itself to supply. Large collections of Indian Insects have been got together, and additions are constantly being made with the view of rendering them truly representative of the insect fauna of the country.

In the early part of last year, at a meeting of your Society, the help of European entomologists was invited for the determination of the unnamed portion of these collections. Since then various entomologists have consented to undertake the determination of special groups, and are now engaged in working them out. There remains, however, a considerable number of groups which have not yet been undertaken, and it is for help in the determination of these groups that I now apply to your Society.

The collections have already been arranged as far as is possible in India, so that specimens belonging to each fairly well-marked group can immediately be picked out to send to

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the entomologist who undertakes to examine them. The Museum will pay all expenses connected with the packing and carriage of the specimens, and, when possible, will send duplicates, in addition to the set required to be returned for exhibition in the Museum.

It is hoped that amongst the entomologists of your Society who make a study of special groups of insects, there may be found some who are willing and able to avail themselves of the present opportunity of assisting in a work which cannot but tend most materially to the advancement of the study of the little-known Entomology of India.

The following are the chief groups not yet undertaken, and for which, therefore, assistance is desired:—NEUROPTERA.—*Myrmeleonidæ*, *Panorpidæ*, *Ascalaphidæ*, *Mantispidæ*, *Hemerobiidæ*, *Sialidæ*, *Trichopteridæ*, *Termitidæ*. PSEUDO-NEUROPTERA.—*Perlidæ*. DIPTERA. — *Nemocera*. COLEOPTERA. — *Carabidæ* (except genera *Carabus* and *Calosoma*), *Hydrophilidæ*, *Faussidæ*, *Dermestidæ*, *Lucanidæ*, *Coprini*, *Rutelini*, *Dynastini*, *Cetonini*, *Monommidæ*, *Lagriidæ*, *Melandryidæ*, *Cleridæ*, *Rhiphidoceridæ*, *Anthicidæ*, *Bruchidæ*, *Anthotribidæ*, *Sagrinæ*, *Cryptocephalinæ*, *Halticinæ*, *Galerucinæ*, *Languriidæ*.

Any communication addressed to me on the subject of the determination of the above groups of insects will receive prompt attention.

The following is a list of the gentlemen who have already consented to work out the groups, other than those in respect of which assistance is now invited:—Mr. F. Moore, Mons. Ragonot, Col. Swinhoe, Lord Walsingham, Mr. De Nicéville, Mr. E. T. Atkinson, Mr. W. L. Distant, Mons. Bigot, Dr. Forel, Mr. P. Cameron, Mons. Le Baron de Selys-Longchamps, Rev. A. E. Eaton, Mr. Wood-Mason, Dr. Regimbart, Mons. De Saussure, Mons. Fleutiaux, Mons. Gelmi, Mons. Fauvel, Mons. Gronville, Mons. L'Abbé S. A. de Marseul, Herr Ernst Breuske, Dr. Candeze, Rev. H. S. Gorham, Mons. Desbrochers de Loges, Dr. Lamere, and Mons. E. Lefevre.

I have the honour to be, Sir,

Your most obedient Servant,

E. T. ATKINSON,

Chairman of the Trustees of the Indian Museum, Calcutta.

The Secretary to the Entomological Society of London.

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The following motion, which had previously been unanimously passed at the meeting of the Council, was read to the Society:—"That papers containing descriptions of isolated species widely remote in classification or distribution, are, as a rule, undesirable for publication, as tending to create unnecessary difficulties for faunistic or monographic workers." Mr. M'Lachlan, Mr. Jacoby, Mr. Elwes, Dr. Sharp, and others took part in the discussion which followed.

Mr. J. W. Slater exhibited a doubtful specimen of *Arctia mendica*, L., which appeared as if it might prove to be a hybrid between that species and *A. lubricipeda*, L.

Mr. M'Lachlan, on behalf of Prof. Klapálek, of Prague, who was present as a visitor, exhibited preparations representing the life-history of *Agriotypus armatus*, Walk., showing the curious appendages of the case. Prof. Klapálek, in answer to questions, described the transformations in detail. A discussion followed, in which Mr. M'Lachlan and Lord Walsingham took part.

Mr. H. J. Elwes exhibited a specimen of an undescribed *Chrysophanus*, taken in the Shan States, Upper Burmah, by Dr. Manders, which was very remarkable on account of the low elevation and latitude at which it was found; its only very near ally appeared to be *Polyommatus Li*, Oberthür, from Western Szechuen, but there was no species of the genus known in the Eastern Himalayas or anywhere in the Eastern tropics.

Mr. G. T. Porritt exhibited a remarkable series of *Arctia mendica*, L.

Mr. R. W. Lloyd exhibited specimens of *Harpalus cupreus*, Steph., and *Cathormiocerus socius*, Boh., recently taken at Sandown, Isle of Wight.

Mr. O. E. Janson exhibited a fine male example of *Theodosia howitti*, Castlenau, a genus of *Cetoniidæ* resembling some of the *Dynastidæ* in the remarkable armature of the head and thorax. The specimen had recently been received from N.W. Borneo.

Mr. W. White exhibited specimens of *Heterogynis paradoxa*, Ramb., and stated that this insect represented an extreme case of degeneration, the mature female being only slightly

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more developed than the larva; the ova are hatched within the body, so that apparently the ovipositor is entirely atrophied. Lord Walsingham made some remarks on the subject.

Mr. W. Warren exhibited bred specimens of *Tortrix piceana*, L.

Mr. T. R. Billups exhibited specimens of *Actobius signaticornis*, Rey, and *A. villosulus*, Steph., taken near Lewisham. He also exhibited specimens of *Eulophus damicornis*, Kirby, belonging to the family *Cynipidæ*, bred from pupæ found by Mr. Adkin attached to the leaves of lime-trees at Oxshott, Surrey; the host was unknown.

Papers read.

Mr. Porritt read "Notes on an extraordinary race of *Arctia mendica*, Linn."

Mr. W. F. Kirby read a paper entitled "Descriptions of new species of *Scoliidæ* in the collection of the British Museum, with occasional reference to species already known."

Mr. J. B. Bridgman communicated a paper entitled "Further additions to the Rev. T. A. Marshall's Catalogue of British *Ichneumonidæ*."

Mr. J. S. Baly communicated a paper "On new species of *Diabrotica* from South America."

August 7, 1889.

The Right Hon. Lord Walsingham, M.A., F.R.S., President, in the chair.

Donations to the Library were announced, and thanks voted to the respective donors.

Election of Fellows.

The Rev. John Walley, of Wuhu, China, was elected a Fellow; and Prof. Charles V. Riley, M.A., of Washington, United States, was elected an Honorary Fellow in place of the late Dr. Signoret, of Paris.

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Exhibitions, &c.

Mr. Walter F. Blandford exhibited a specimen of *Cardiophorus cinereus*, Herbst, taken at Tenby, and remarked that the species had rarely, if ever, previously been found in the United Kingdom. Mr. C. O. Waterhouse said he believed that there was a specimen in the collection of his late father, and also another specimen in the collection of the British Museum.

Mr. C. O. Waterhouse stated that the British Museum had just received, from the Rev. Arthur Elwin, of Hangchow, China, a luminous larva. It was about 1½ in. long and 3½ lines broad at the widest part, a little narrowed in front, gradually acuminate to the apex, very convex, shining, with some very short inconspicuous pale pubescence; pale brownish yellow (when dead), with pale yellow markings. Its appearance at first sight was that of a meal-worm (*Tenebrio*). Mr. Elwin stated that when full-grown it was 2 in. long. In ten years he had only seen four specimens. Eleven segments have each three very bright spots of light, one dorsal and one on each side; in all thirty-three spots. The light was not affected by handling, and shined continually day and night, and was so bright that it was visible for a considerable distance. The specimen sent showed the light for three days after death. Mr. Waterhouse said that, although quite unlike anything known to him, he had no doubt, from the structure of the head, &c., that it was one of the *Lampyridæ*, but he knew of no species of which it was likely to be the larva.

Lord Walsingham exhibited specimens of *Conchylis degreyana*, M'Lach., bred from seed-heads of *Plantago lanceolata* at Merton, Norfolk; also a specimen of a species of *Tineidæ* allied to the genus *Solenobia*, probably belonging to *Dissoctena*, Staud., but differing somewhat in the structure of the antennæ. Lord Walsingham remarked that the specimen was taken by himself at Merton on the 31st July last, and that the species was apparently undescribed.

Mr. Meyer-Darcis exhibited a collection of Coleoptera, comprising specimens of a species of *Loethrus* from Turkestan; *Julodis globithorax*, Stev., from the Caucasus; a new species of *Julodis* from Kurdistan: *Cardiaspis Mouhotii*, Saunders, from

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Sikkim; *Carabus smaragdinus*, Fisch., from Siberia; *Julodis ampliata*, Mars., from Aintab, Asia Minor, and a variety of the same from Kurdistan; and *Julodis luteogramma*, Mars., from Syria, and a variety of the same from Kurdistan.

Mr. H. Goss read the following letter from Mr. R. W. Fereday, of New Zealand:—

Christchurch, Canterbury,
New Zealand,
June 14th, 1889.

Dear Sir,—I am sending you by my nephew, Mr. A. P. Chapman, who left here yesterday for England, a box of insects, consisting of Coleoptera contained in two small bottles, a specimen of Hymenoptera in a small match-box, and some Lepidoptera. Will you kindly bring to the notice of the Society the following particulars relating to the specimens of Lepidoptera and Hymenoptera, and exhibit them at your next meeting.

In January last I received a letter from Sir John Hall, K.C.M.G., who had then recently gone to England, in which he wrote me as follows:—"When on my voyage home in the 'Kaikoura' a curious incident occurred, which I thought might be turned to the advantage of your entomological collection. About half-way between the River Plate and Rio, and at a distance of over 250 miles from land, the ship was visited by a numerous flight of various kinds of moths. The visitation commenced in the evening, lasted more or less all the next day and part of the succeeding night. As the ship steamed about 300 miles a day, it follows that the atmosphere for about 400 miles must have been pretty full of these moths. Several of them were caught, and some I have placed in a box, which Mr. East, the chief officer of the 'Kaikoura,' has taken charge of and promised to have sent to your office. I do not know that the specimens are of any value, while all of them have been roughly handled, and some, I fear, spoilt. They may, however, have some interest from the circumstances under which they were caught. It was supposed the moths might have been driven off the land by violent westerly winds, but on arriving at Rio we could not hear that anything violent

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had been experienced. The wind with us on board the 'Kaikoura' was moderate from N.N.W. Mr. East has taken a good deal of trouble to secure these specimens for me, and in getting a box made."

I duly received the insects from Mr. East when he arrived here in February in the 'Kaikoura,' on her return voyage, and they are the specimens of Lepidoptera which I send you. On Sir John Hall's return to New Zealand I asked him if he could give me the lat. and long. in which the occurrence took place, and, after consulting his diary, he wrote me as follows:—"I find that it was about S. lat. 30 and W. long. 46 that we fell in with the swarms of moths, of which I sent you specimens. My diary says of the weather that we had not very strong wind at the time, but a strong head-sea, and a barometer almost low enough for a hurricane. When we reached Rio Janeiro we did not find that any exceptionally strong wind had been blowing there, but no doubt it had urther south." It seems to me that this occurrence is of more than ordinary interest owing to the many families, genera, and species which must have been represented in the swarm, for, besides those specimens preserved, I understand from Sir John there were numerous kinds, large and small. Will you kindly get them named, and, if there are any of them new to science, get them described. I should like to have them back again for our Museum, but I suppose if any of them are new, the describer will require to keep such for the type.

As to the hymenopterous insect, it was taken about two months ago by a Mr. Hamilton at Riccarton, four miles from here, in one of his bee-hives. He had noticed that the hive seemed almost deserted, and on looking into it observed a small dome of thin wax covering something on the floor of the hive; and, on detaching the dome, he found within it this insect. Its legs, which have since got broken off, and are enclosed in a piece of paper, were then attached to the body, but when handed to me it had no wings, and Mr. Hamilton did not notice any when he found it. He said, in reply to my question, that the bee entrance to the hive was small, but sufficient to admit such an insect as this. My

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theory is that the insect, having entered the hive, was attacked and killed by the bees, and its wings bitten off, and that they, finding a difficulty in pushing it out through the entrance, entombed it in a wax cell. It does not appear to me to be an insect likely to have been introduced into this country, and yet, if indigenous, it is remarkable that such a conspicuous insect has not been noticed before, for there is no insect I have ever seen in New Zealand that in the slightest degree resembles it, except the humble-bee, which is only of recent introduction. I can hear of no one having noticed such an insect before in New Zealand. It was only on the first attempt to introduce the humble-bee to New Zealand that it was brought out in its nest, and on that occasion the bees were found all dead, and the box in which they came was closed up again and laid aside for months, so that an insect of this description could hardly have been introduced with those nests. If it were not for the ocelli being in a line instead of in a triangle, I should assume it to be a species of *Cœlioxys*, Lat.

If you can return me any of the insects it will be well not to send them by post; but if not giving you too much trouble, would you see either Sir F. Dillon Bell, K.C.M.G., C.B., the Agent-General for New Zealand, 7, Victoria Chambers, Westminster, or the New Zealand Shipping Company, or Messrs. Shaw & Savill, Albion Shipping Company, who would, I am sure, get some passenger coming direct here (Christchurch) to take charge of the box.

Speaking of the humble-bees, it was *marvellous* how rapidly they increased after being introduced here. The year after they were turned out they were quite common around Christchurch, and were even seen fifty miles and more away. The clover is now producing abundance of seed, and the humble-bees are all over the island.

Yours faithfully,

RICH. WM. FERRDAY.

H. Goss, Esq., Secretary,
Entomological Society of London.

Mr. J. J. Walker, R.N., observed that he had seen a large number of insects at sea about 150 miles off the coast of

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Brazil, and he referred to other records of the capture of insects at sea in Darwin's 'Voyage of the Beagle,' and Dr. Coppinger's 'Cruise of the Alert.' The discussion was continued by Dr. Sharp, Lord Walsingham, Mr. White, Mr. Kirby, and others.

Mr. Blandford read a letter from Mr. Wroughton, of Poona, Deputy Conservator of Forests, asking for assistance in working out certain Indian Hymenoptera and Diptera in the collections of the Bombay Natural History Society. Lord Walsingham, Colonel Swinhoe, and Mr. Moore made some remarks on the subject.

Paper read.

Mr. E. Meyrick read a paper entitled "On some Lepidoptera from New Guinea," and exhibited the species described in the paper. He stated that the specimens were derived from two sources, *viz.* (1), a portion of the collection received by the Society from Baron Ferdinand von Müller, F.R.S., and collected by Mr. Sayer when accompanying the Australian Geographical Society's Exploring Expedition; and (2), a number of specimens collected by Mr. Kowald near Port Moresby, and obtained from him by Lord Walsingham.

September 4, 1889.

Henry J. Elwes, Esq., F.L.S., F.Z.S., Vice-President, in the chair.

Donations to the Library were announced, and thanks voted to the respective donors.

Election of Fellows.

Prof. C. H. Fernald, of Amherst, Mass., U.S.A., and Mr. C. J. Fryer, of Emscote Road, Warwick, were elected Fellows.

Exhibitions, &c.

Mr. George T. Baker exhibited two remarkably dark specimens of *Acronycta ligustri* taken near Llangollen.

Mr. P. B. Mason exhibited and remarked on a collection of Lepidoptera which he had recently made in Iceland. The

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following species, amongst others, were represented, viz.:—*Crymodes exulis*, *Triphæna pronuba*, *Noctua conflua*, *Plusia gamma*, *Larentia cæsiata*, *Eupithecia scoriata*, *Melanippe sociata*, *Coremia munitata*, *Phycis fusca*, and *Crambus pascuellus*.

The Rev. Dr. Walker also exhibited a number of Lepidoptera, Diptera, and Hymenoptera, recently collected by himself in Iceland. The collection included the following, viz.:—*Crymodes exulis*, *Noctua conflua*, *Larentia cæsiata*, *Coremia munitata*, *Culex pipiens*, *Scatophaga stercoraria*, *Calliphora erythrocephala*, *Helophilus grœnlandica*, *Bombus terrestris*, &c.

Mr. W. White exhibited, on behalf of Mr. G. C. Griffiths, a specimen of *Nephronia hippia*, Fab., var. *gæa*, Feld., having the external characters of the male on the right side, and of the female on the left side, and which he believed to be hermaphrodite. He said it was exactly similar to the types of *gæa* figured by Distant ('Rhopalocera Malayana'), with the exception that the marginal spots on the upper wing side are much developed and larger. This however, might be a transference of character from the female influence, as a result of hermaphroditism. An enlarged sketch of the genitalia (which were fortunately pressed out) exhibited what he supposed to be the ovipositor, and a single clasping organ on the male side. He further pointed out that the species was an interesting one also on account of its mimicking two species of *Danais*—*agleoides* and *melaneus*—equally. Mr. White quoted Mr. Distant as considering *gæa* to be a variety of *hippia*, and as distinct from *valeria* "by the character of the pale-spotted outer margin of the anterior wings. Even treated as a distinct variety, considerable variation is discovered amongst the female examples, particularly as regards the amount of ochraceous markings on the abdominal area of the upper surface of the posterior wings, and the depth of hue of the under surface of the same wings, which are either infuscated, as in the specimen figured, or almost greyish, as in other examples. The fuscous margin containing the series of pale spots is, however, always present" (p. 321 'Rhopalocera Malayana').

A discussion on hermaphroditism ensued, in which Mr. Distant, who exhibited type examples of the species, Mr. Elwes, Mr. M'Lachlan, and Mr. Baker took part.

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Dr. Sharp exhibited specimens of *Cychramus luteus* and *fungicola*, Auct., and stated that they are the sexes of one species, *C. luteus* being the male, *C. fungicola* the female. In working through the Central American *Cychramini*, he had found that in some genera the males differed greatly from the females in size and sculpture; but this was not a constant character, for in some species, while certain males scarcely differed from the females in these respects, others were so different that they would scarcely be recognised as belonging to the same species.

Mr. Edward A. Butler exhibited specimens of *Platymetopius undatus*, Deg., from Ewhurst, Surrey. He remarked that the species was recorded as having been once previously taken near Plymouth by the late Mr. John Scott.

Papers read.

Mr. G. T. Baker read a paper entitled, "On the distribution of the Charlonia group of the genus *Anthocharis*." Mr. Baker stated that the species, six in number, of this small division of the genus *Anthocharis* formed a very natural and closely allied group, presenting many points of interest, both in their relationship to each other and in their geographical distribution, which extends from the Canaries on the west to the valley of the Indus on the east. The author's theories as to the causes of the present distribution of the group, which were based on geological data, were discussed by Mr. Elwes, Mr. M'Lachlan, Mr. Distant, and Mr. Stainton.

Mr. Elwes read a paper entitled, "A revision of the genus *Argynnis*." In the course of the discussion which ensued Mr. Elwes expressed an opinion that in the fore wings of the males of *Argynnis paphia*, and some other species of the genus, there was a dilatation or thickening of the nervules. Mr. Jenner Weir stated that he thought that there was no real dilatation, but that the apparent thickening of the nervules was due to a dense covering of broad scales. He said he was supported in his views by the opinions of Mr. S. H. Scudder, Dr. Staudinger, and Dr. Schatz. The discussion was continued by Mr. Distant, Prof. Riley, and others.

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October 2, 1889.

The Rt. Hon. Lord Walsingham, M.A., F.R.S., President in the Chair.

Donations to the Library were announced, and thanks voted to the respective Donors.

Election of a Fellow.

Mr. Arnold Umfreville Henn, of Heaton Chapel Rectory, near Stockport, was elected a Fellow.

Exhibitions, &c.

Mr. F. P. Pascoe exhibited a number of species of Coleoptera, Lepidoptera, Hymenoptera, Neuroptera, Hemiptera, Orthoptera, and Diptera, all named, collected by himself during the past summer at Brindisi, and in Greece and the Ionian Islands.

Mr. J. W. Douglas sent for exhibition specimens of *Lygus viscicola*, Puton, a species new to Britain, taken at Hereford, in September last, exclusively from mistletoe, by Dr. T. A. Chapman.

Mr. R. M'Lachlan exhibited nearly one hundred specimens of Trichoptera recently collected in Iceland by Mr. P. B. Mason. Only six species were represented, and of these five had been previously recorded from the island. Mr. M'Lachlan remarked on the great amount of variation existing in some of the specimens.

Mr. E. B. Poulton exhibited a mounted specimen of the yellow powder from the cocoon of *Clisiocampa neustria*, under a power magnifying 188 diameters. The powder was thus seen to consist of crystals, so minute that the form could only just be made out under this power. Mr. Poulton said that it had independently occurred to him and the Rev. J. W. B. Bell, another member of the Oxfordshire Natural History Society, to work at this powder. Mr. Bell first discovered its crystalline nature, and the fact that it is discharged from the anus of the larva: he was, however, unable to make out its chemical constitution. Mr. Poulton dissected a mature larva, tracing the powder back to its origin

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in the malpighian tubules, and confirmed Mr. Bell's results. With the help of Mr. A. G. Vernon Harcourt, its chemical nature was investigated in the laboratory of Christchurch, Oxford. The yellow colour was destroyed at a comparatively low temperature, leaving the crystals unaltered: the former is therefore in all probability some unstable organic pigment. The stability of the crystals at high temperatures proved them to be inorganic, and they were then found to dissolve with effervescence in dilute hydrochloric acid, while calcium chloride was proved to exist in the solution. This, with the fact of effervescence, showed that the crystals are carbonate of lime. The presence of calcium was then confirmed by spectroscopic tests. A specimen of the powder was sent to Mr. H. A. Miers, of the Mineralogical Department of the Natural History Museum, who concluded that the crystals were in the form of Aragonite.

Mr. Stainton said he should like to know if Mr. Poulton was certain as to the source of this powder in larvæ.

Mr. Poulton stated that, as he had already explained, the powder was contained in a crystalline form in the malpighian tubules of the larva, and was discharged from the anus.

Lord Walsingham commented on the interesting nature of the experiments, and asked Mr. Poulton if he had ever examined in a similar way the powder on the scales of the wings of Lepidoptera. Mr. Poulton replied that he had not yet done so.

Mr. M. Jacoby enquired if the powder on the pupa of *Catocala nupta* had ever been subject to a critical examination. Mr. Poulton said he was not aware that it had.

Mr. M'Lachlan asked Mr. Poulton if he was quite satisfied that the malpighian tubes were renal organs. He said he believed many entomologists considered that they were biliary organs.

Mr. Poulton replied that Dr. MacMunn (of Wolverhampton) had described a simple process by which crystals of uric acid could easily be extracted from the tubules. The liver of Vertebrates is an excessively complex organ, with many functions, and it is very doubtful whether any single organ among the Invertebrates corresponds to it with any

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precision. The organ which was formerly called the liver in such an animal as the Crayfish is now more correctly called the hepatic gland, because of the improbability of any true analogy to the Vertebrate organ. The functions of the renal organ are far more definite, and this term may be correctly applied to *any* organ which eliminates nitrogenous waste. Such elimination very commonly takes the form of uric acid, and the normal presence of this substance as an excretion in the tubules was sufficient warrant for describing them as renal. The elimination of calcium carbonate in the case of *C. neustria* was by no means antagonistic to the conclusion that the organs are renal. If such a substance requires excretion, it is far more likely to pass off by the renal organ than any other. The occurrence of crystals of carbonate of lime in the urine of herbivorous Vertebrates was well known. The proportion of calcium in the leaves of plants is large, and we must suppose that its excretion in the solid crystalline form is delayed until the close of larval life, when the powder would be of some value in assisting to render the cocoon opaque. The last fæces ejected during larval life are often peculiar in consistence, and in colour. Those of the larva of *Cerura vinula* are red. It is very probable that this, too, is due to some substance which is excreted in large amount at a corresponding period to that of *C. neustria*, only without the excretion being of any ascertainable use to the species.

Dr. Sharp said he believed that Mr. Griffiths had lately written a paper on the malpighian tubes of Dragonflies, in which he had shown that the function of these organs was renal.

Mr. Poulton also exhibited some photographs of the living larvæ of *Hemerophila abruptaria*, showing the different depths of colour which had been induced by experiment. Specimens of the larvæ preserved in spirit were also shown, together with water-colour representations of the two varieties. As in other experiments of the kind, the larvæ had been rendered very light by being surrounded by green leaves and stems only, while they became extremely dark when an abundance of dark twigs was intermingled with the leaves of the same food-plant (lilac). All the larvæ made use of were hatched

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from eggs laid by a single female. Great difficulty was experienced in finding a photographic plate which registered the effects satisfactorily. Eventually Edwards' isochromatic plates were found to give good results: a magic lantern with a paraffin lamp was used for illumination, the beam of light being passed through a sheet of yellow glass. An exposure of one minute was given. Mr. Poulton said he was indebted to the Rev. J. G. Burch for assistance in obtaining the photographs exhibited.

Mr. F. Merrifield said that Dr. Chapman had recently obtained similar results from experiments made with the larvæ of *Ennomos alniaria*.

The Rev. Dr. Walker exhibited, and read notes on, a number of Coleoptera, Neuroptera, Hymenoptera, and Diptera, which had been named since the last meeting, and formed the second instalment of the collection which he had recently made in Iceland.

Mr. R. South exhibited an aberrant specimen of *Luperina testacea*, bred from a pupa found at the root of a species of *Silene* at Eastbourne; and a pale specimen of *Luperina Nickerlii*, Freyer, caught in Lancashire last August by Mr. Baxter. He also exhibited a long and interesting series of *Boarmia repandata*, the offspring of parents bred from larvæ collected in North Devon, and read the following notes on them:—

"On the evening of June 20th, 1888, three male and two female specimens of the *conversaria* form of *Boarmia repandata*, and also one female variety of the *destrigaria* form, had freshly emerged in their breeding-cage. These were allowed to remain undisturbed until the following evening, when they were removed to a leno-covered box, and left therein until the morning of the 22nd, when the females were each placed in a large-sized chip box. On the morning of the 23rd it was noted that each female had deposited a small cluster of eggs on the side or bottom of her box; other batches of eggs were deposited on the 24th and 25th. The ova soon changed from green to pink, and subsequently to dark grey; a few larvæ made their appearance on July 1st, and on the 8th of that month all had hatched out.

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"The young larvæ were at first sleeved out on a sallow-bush, each brood being kept separate, and properly registered. In numerical strength they were about equal at this time. On the approach of winter, two of the broods, B, C, were removed from the sallow-bush, and confined in breeding-cages, at the bottom of which plenty of dead leaves and twigs had been placed. Other twigs were cut from the sallow-bush at intervals throughout the winter, and, together with twigs of *Jasmine nudiflora*, placed in the water-holder in each cage. Although the larvæ occasionally nibbled the bark of each plant, they did not thrive well, but, on the contrary, gradually dwindled and died, for on examining the cages early in March it was found that only sixteen individuals of brood B and three of brood C had survived. The decrease in number of larvæ had been previously noticed, but it was supposed that they had simply retired between the leaves at the bottom of their cages. Enumeration of the survivors of brood A, which had been kept on the sallow during the whole winter, and were consequently exposed to all weathers, showed a total of fifty-six healthy larvæ. The remnants of broods B, C, were again sleeved out, and, as the sequel will show, did very well.

"All the larvæ, when nearly full-grown, were changed from the sallow bush into breeding-cages, in which was earth covered with about an inch of moss. The moths commenced to emerge on June 14th, and continued to do so until July 8th, on which date the last specimen, a male of brood B, closed the list.

Analysis of the broods A, B, C.

"A. ♀ *destrigaria*, var. × ♂ *conversaria*. — Fifty-six larvæ produced the same number of imagines, of which eleven males and twelve females are more or less like the female parent, while thirteen males and twenty females are of the male parent form.

"B. ♀ *conversaria* × ♂ *conversaria*. — Sixteen larvæ produced fifteen imagines, nine males and four females being of the parent form, and one specimen of each sex more or less typical in character.

"C. ♀ *conversaria* × ♂ *conversaria*.—Three larvæ produced two imagines of the parent form.

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"In the case of B and C respectively, the results are unsatisfactory, because incomplete as regards C especially; but it is perhaps worthy of mention that among the offspring of pair B are three specimens of an extreme aberration of the *conversaria* form similar to examples I exhibited here in 1887, when I suggested that such varieties originated in the pairing of male and female *conversaria*.

"With regard to brood A, the experiment has been comparatively complete, and the result shows that the majority of the offspring have inherited the special characters of one or other of their parents. Of the remainder, nine males are almost identical in form, and represent a variety of *B. repandata* which is not common in the locality from which the original stock came, whilst two individuals appear to be intermediate between the female parent form and typical *B. repandata*."

Mr. Poulton enquired whether the larvæ which had been experimented upon were uniform in colour, or extremely variable, like those in a wild state.

Mr. South replied that, as regards colour, the larvæ in each brood were similar, all being pale brown, but there was some slight difference in the intensity of dorsal ornamentation. The larvæ collected in N. Devon from which the parents were bred exhibited an extensive range of colour-variation, from pale brown through all shades of red-brown to dark almost blackish brown. As has been previously stated, these were found on bilberry and heather, both plants being mixed together in rich masses. When in repose during the daytime the red or dark brown larvæ would assimilate well with the heather-stock, and the pale larvæ with the bilberry-stem. As they were observed at night, however, when feeding on the foliage of the plants, they did not harmonise well, but, on the contrary, were often in strong contrast with their immediate surroundings. Directly the light from the lamp shone upon them they sought protection by assuming a twig-like attitude, but the ruse was not always successful, as a dark-coloured larva on a whitish brown or pale green twig was not less conspicuous than a pale larva on a dark twig; their rigid stillness would probably, however, deceive the unpractised eye.

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Mr. Poulton, Mr. Merrifield and Lord Walsingham continued the discussion.

Mr. J. J. Walker, R.N., exhibited a collection of Coleoptera made during the past summer in Cobham Park, Kent. Thirty-three species were represented, amongst which were the following, viz., *Eros minutus*, *Philonthus fuscus*, *Homalota hepatica*, *Abræus granulum*, *Anisotoma grandis*, *Agaricophagus cephalotes*, *Thalycra sericea*, *Cryptophagus ruficornis*, *Platytarsus setulosus*, &c. He also exhibited a living larva of *Helops cæruleus*.

Mr. Jacoby exhibited a curious Phytophagous beetle found by Mr. J. H. Leech in the Corea. He stated that he was unable to determine the species, as was also Mr. J. S. Baly, to whom he had submitted the specimen.

Mr. R. Adkin exhibited specimens of *Retinia resinella*, received by him from Forres. Lord Walsingham remarked that he had never seen the species in Scotland, but that it was not uncommon in Germany, and he had found it at Hamburgh.

Mr. W. Dannatt exhibited a male specimen of *Papilio antimachus*, Drury, received from Lukolela, a missionary station about 500 miles from the mouth of the Congo. He stated that the species, although very rare, had a wide range, as three other specimens of it had been received from the Stanley Falls, which were more than 800 miles further up the Congo than Lukolela.

Lord Walsingham exhibited specimens of the larva and imago of *Cidaria reticulata*, collected in the Lake District, and sent to him by Mr. Hodgkinson.

Mr. W. White stated that as some doubt had been expressed at the last meeting as to whether the specimen of *Nephronia hippia*, Fab., var. *gæa*, Feld., which he then exhibited, was an hermaphrodite, he had, with Mr. Griffith's permission, handed the specimen to Mr. G. T. Baker for dissection.

Mr. J. Jenner Weir exhibited fore wings of the males of *Argynnis paphia*, *A. adippe*, and *A. atlantis*, denuded of the scales, in order to show that there was no dilatation or thickening of the median nervules and submedian nervure in that sex of these species; but that the apparent dilatation

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was produced by a dense mass of scales crowded together on each side of the nervules.

Paper read.

Mr. Jenner Weir read the following short paper, entitled "Notes on the nervules of the fore wings in the males of *Argynnis paphia* and other species of the genus":—

In the course of a discussion which took place at the last meeting of this Society on the nervules of the fore wings in the males of *Argynnis paphia*, it was stated that there was a dilatation or thickening of these nervules. I then expressed an opinion that there was no such dilatation or thickening of any of the nervules, but that their apparent dilatation was produced by a dense mass of scales crowded on each side of them. This view I deemed to be well known, but as no one supported my opinion, I have this evening brought here the wings of three species of *Argynnis*, an examination of which will, I think, prove the correctness of my assertion. The wings of *Argynnis paphia*, which I exhibit, have been denuded of their scales by the Waterhouse process. I have found that, although this process removes the ordinary scales from the wings, it has but little effect on the black androconia, which, in this species, so densely clothe the central part of the submedian nervure, and first and second median nervules. It was only by using considerable friction with a camel's-hair brush that I succeeded in removing these scales. The androconia are therefore somewhat differently constituted to the ordinary scales of the wings; and even the scales that overlap them appear to be much more difficult to remove than ordinary scales.

I also exhibit the upper wings of *Argynnis adippe*, which have been treated in the same manner as those of *A. paphia*. In this species (*A. adippe*) the androconia were more easily removed, but still required the aid of a brush; they exist on the first and second median nervules only.

I have also with me fore wings of the male of the American species, *Argynnis atlantis*. In this butterfly there are androconia on the two radial and three median nervules, and on the submedian nervure; this is a mode of their distribution

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common to several American species, such as *Argynnis cybele* and *A. aphrodite*.

The androconia are sometimes so small that they can only be readily distinguished by the desquamation of the wings; but they will, I think, be found in all the species of the genus *Argynnis*, though not in *Brenthis*, which latter genus has a much weaker structure of wing, and consequently the species belonging to it are more feeble in flight, resembling in this respect when on the wing, those of the genus *Melitæa*, for which I have often mistaken them.

An examination of the denuded wings now exhibited will, I think, convince anyone that the nervules and nervures in question are in no way dilated or thickened. I have not studied the Argynnidi sufficiently to enable me to speak with much authority on the subject; but I think it will be found that the presence or absence of the androconia, together with their distribution on the nervules, would afford considerable aid in dividing them into convenient groups, whether genera or subgenera. I have been induced to express this opinion because in studying the Danaine Butterflies I have found the secondary sexual characters of great use in dividing them into natural genera, as shown by Mr. Moore in his monograph of that division of butterflies which appeared in the Zoological Society's 'Journal of Proceedings' for the year 1883.

I may say, in conclusion, that, with the exception of the fact of the resistance of the androconia to the action of the Waterhouse process, the other facts set forth in these notes have already been referred to both by American and European writers on the order Lepidoptera.

Lord Walsingham, Mr. Distant, and others took part in the discussion which ensued.

November 6, 1889.

Prof. J. O. Westwood, M.A., F.L.S., Hon. Life-President, in the chair.

Donations to the Library were announced, and thanks voted to the respective donors.

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each side of the nervules.

Paper read.

Mr. Jenner Weir read the following
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Brown at Keyingham, Yorkshire, on the 22nd of
also a specimen of a variety of *Crabro interruptus*,
found by Mr. F. Woodbridge in a hole in a log at

Mr. W. L. Distant exhibited a male and female specimen
of a species belonging to a new genus of *Discocephalinæ*, from
Guatemala, in which the sexes were totally dissimilar, the
female having abbreviated membranes, and being altogether
larger than the male.

Dr. D. Sharp stated that he had observed that in the *Ipsinæ*
division of *Nitidulidæ* there was present a stridulating organ
in a position in which he had not noticed it in any other

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Coleoptera—*viz.* on the summit of the back of the head. He had found it to exist not only in the species of *Ips* and *Cryptarcha*, but also in other genera of the subfamily; on the other hand, he could not find any trace of its existence, except in members of the *Ipsinæ*. He exhibited specimens of *Ips* and *Cryptarcha*, mounted to show the organ. Dr. Sharp also exhibited a box of *Rhynchota*, chiefly *Pentatomidæ*, in which the specimens were prepared so as to display the peculiarities of the terminal segment in the male sex.

Mr. R. Adkin exhibited, on behalf of Mr. H. Murray, of Carnforth, a fine series of *Polia xanthomista*, var. *nigrocincta*, from the Isle of Man, and *Cidaria reticulata* and *Emmelesia tæniata* from the Lake District.

Mr. W. White exhibited a living larva of *Zeuzera æsculi*, and called attention to the chitinous scuta on thoracic segments furnished with several rows of minute serrations, which evidently assist progression. He stated that the larva exudes from its mouth, when irritated, a colourless fluid, which he had tested with litmus-paper and found to be strongly alkaline. Prof. Westwood made some remarks on the subject.

Mr. H. J. Elwes exhibited a number of insects of various orders, part of the collection formed by the late Otto Möller, of Darjeeling.

Mons. A. Wailly exhibited the cocoon of an unknown species of *Antheræa* from Assam; also a number of cocoons and imagos of *Anophe venata* from Acugua, near the Gold Coast, West Africa; specimens of *Lasiocampa otus*, a South European species, which was said to have been utilised by the Romans in the manufacture of silk; also a quantity of nests containing the eggs of *Epeira madagascariensis*, a silk-producing spider from Madagascar, locally known by the name of "Halabe." He also read the following extracts from letters received from the Rev. P. Camboué, of Tananarivo, Madagascar, on the subject of this silk-producing spider. In the first letter, dated 9th of May, 1889, Mons. Camboué said:—

"I have followed with interest your communications to the Entomological Society during last year. How I should like you to try the rearing of one of our silk-producing *Araneidæ*, the great *Epeira*, 'Halabe,' *Epeira madagascariensis* (Vins.)!

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I do not know if I am entertaining an utopian idea, but it seems to me that some day the silk of the large *Araneïdæ* will be utilised. I am now actively occupied with the study of this subject, which is most interesting. If you wish it, I will send you fertile ova of 'Halabe,' which, I am almost certain, will reach you in good condition."

Mons. Wailly said, that having written to the Rev. P. Camboué that he should be pleased to try the rearing of the 'Halabe,' and having suggested that its rearing might also be tried, with a better chance of success, in the Insect-house of the Zoological Gardens, he received on the 5th of October four nests of eggs, two of which he took to the Zoological Gardens.

In the next letter, dated August 25th, which accompanied the box containing the nests of eggs, the Rev. P. Camboué said:—"The eggs will perhaps reach you after the hatching of the young spiders on the way, but, even then, I hope many of these young 'Halabe' will still be full of vigour on the receipt of the parcel. Do not be uneasy about the food" (I had expressed great fears respecting the success of the undertaking on account of the food-supply). "If live preys fail, give them pieces of raw meat, or else, as long as the 'Halabe' are small, sprinkle the webs with water strongly impregnated with '*bacteries*.' If you prefer it, give them nothing at all. The 'Halabe,' having no other food, will eat one another! In the struggle for existence, the strongest or the most audacious will devour the weakest or the most timid. The 'Halabe' bears a rather low temperature. It resists our climate on the central hills of the island, where the temperature falls to $+8°$ Cent., $= 46{\cdot}1°$ Fahr., and even lower."

Mons. Wailly stated that one of his colleagues of the "Société d'Acclimatation de France," Mons. J. Fallou, tried to rear and acclimatise the Halabe at Champrosay (Seine et Oise) in 1887, but his attempts ended in complete failure. The young spiders were placed in a "bocal," the top of which was covered with a piece of finely-perforated metallic sheet to give air. The food given to the spiders consisted of Aphides, Micro-Lepidoptera, flies, various species of larvæ, and earth-worms; but, seeing the little animals had no taste for any of these delicacies, he made researches in various

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books. In one, the 'Manuel du Naturaliste,' published in 1771, he found it stated that spiders devour one another, and that they would eat the soft substance of new feathers. In another work ('Histoire des Insectes utiles à l'Homme, aux Animaux et aux Arts,' 1785), the author, treating the question of the usefulness of spiders, quotes Réaumur as having indicated pigeons' feathers as the food for young spiders. Mons. J. Fallou, possessed of this information, gave pigeons' feathers to his young spiders, but they refused to suck the feathers. The spiders in the meantime looked remarkably healthy, although their number seemed to decrease. In the middle of August, my colleague resolved to divide the spiders into two lots, leaving one lot in the "bocal," and placing the other lot on a rock in his garden, the rock being surrounded by water and various shrubs and plants. This appeared to be a favourable spot for the open-air rearing of the *Epeira*. Threads 30 centimetres (about one foot) long were spun from the rock to the stems of the plants, and the spinners retired into the cavities of the rock. But, about the end of August, threads or webs and spinners were no longer to be seen. Had the birds or lizards been feasting upon the spiders? Had the ants driven them away? Or were the little spiders going to hybernate in the cavities of the rock? That is what my colleague was going to ascertain in the following spring. With respect to those which were in the "bocal," some had slightly increased in size and changed skins, but the number diminished so rapidly that at the end of November not one was left alive. In spite of this failure, Mons. Fallou hopes to be able to renew the experiments, and to succeed in ascertaining whether or not this useful spider can be reared and acclimatised in his locality, which is at a short distance from Paris. Mons. Wailly said that Mons. Fallou's report, "Essai sur l'acclimatation d'une espèce d'Aranéide" had appeared in the 'Bulletin' of the Société d'Acclimatation, No. 18, Sept. 20th, 1889.

Mr. H. Goss read a communication received by him from Prof. S. H. Scudder, of Cambridge, Mass., U.S.A., on the subject of his recent discoveries of some thousands of fossil insects, chiefly Coleoptera, in Florissant, Western Colorado, and Wyoming.

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Prof. Westwood remarked on the extreme rarity of fossil Lepidoptera, and called attention to a recent paper by Mr. A. G. Butler, in the Proc. Zool. Soc., 1889, in which the author described a new genus of fossil moths belonging to the Geometrid family *Euschemidæ*, from a specimen obtained by Mr. A'Court Smith at Gurnet Bay, Isle of Wight.

Papers, &c., read.

Mr. F. P. Pascoe read a paper entitled "Additional Notes or the genus *Hilipus*," and exhibited a number of new species belonging to that genus.

The Rev. Dr. Walker read a paper entitled "Notes on the Entomology of Iceland." The author stated that the earliest information on the Entomology of Iceland was contained in a book by Olassen and Povelsen, published at Copenhagen in 1772, a copy of which was in the Royal Library at Copenhagen. The paper contained lists of all the species of Coleoptera, Hymenoptera, Lepidoptera (Heterocera), Neuroptera, Hemiptera, and Diptera, enumerated by the authors abovementioned, by Paijhull, and by Staudinger, in addition to those of the species collected or observed in the island last June and July by Mr. P. B. Mason, and by the author, in their recent expeditions.

Mr. Roland Trimen asked if any butterflies had been found in the island. Dr. Walker said that neither he nor Mr. P. B. Mason had seen any during their recent visit to Iceland, nor were any species given in Dr. Staudinger's list. Mr. Mason, in reply to a question by Mr. G. C. Champion, said that during his recent visit to Iceland he had collected nearly a hundred species of insects, including about twenty Coleoptera. He added that several of the species he had taken had not been recorded either by Dr. Staudinger or Dr. Walker. Mr. Elwes enquired if Mr. J. J. Walker, with his great experience as a collector in all parts of the world, was aware of any land except Iceland, outside the Arctic Circle, from which no butterflies had been recorded. Mr. J. J. Walker replied that the only place in the world which he had visited, in which butterflies were entirely absent, was Pitcairn Island.

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December 4, 1889.

The Rt. Hon. Lord Walsingham, M.A., F.R.S., President in the Chair.

Donations to the Library were announced, and thanks voted to the respective Donors.

Election of a Fellow.

Prof. Franz Klapálek, of the Zoological Department, Royal Museum, Prague, was elected a Fellow of the Society.

Exhibitions, &c.

Mr. W. L. Distant exhibited, on behalf of Mr. Lionel de Nicéville, a branch of a walnut tree, on which was a mass of eggs laid by a butterfly belonging to the *Lycænidæ*. He also exhibited two specimens of this butterfly which Mr. de Nicéville had referred to a new genus and described as *Chætoprocta odata*. The species was said to occur only in the mountainous districts of North-West India, at elevations of 5000 to 10,000 feet above the sea-level.

Dr. D. Sharp exhibited the very remarkable eggs of *Piezosternum subulatum*, Thunb., a bug from S. America. These eggs were taken from the interior of a specimen which had been allowed to putrify before being mounted, so that the contents of the body had afterwards coagulated into a mass of dirt, in which the eggs were embedded. Although the parts of the body of the parent had thus completely rotted away, the eggs were in a perfect state of preservation, except that they were completely encrusted with the black dirt resulting from the decay of the parental tissues; indeed, the materials inside the eggs were still quite fresh, though it was many years since the insect was killed, and the cellular condition of the yelk was very conspicuous. The egg is cylindrical, fully 2 millim. long, and 1 millim. in diameter; one end is rounded, the other truncate; the truncate end is set along the margin with erect processes which may be compared to small-headed nails, the points of which are driven into the cut margin of the egg-shell; inside these processes the egg is closed by a densely-sculptured, quite circular operculum, on the centre of

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which there is fastened a curious appendage, like a funnel, constructed of a quite transparent, chitinous substance; inside this funnel, and seated on the operculum, there is some structure the exact nature of which cannot be determined, owing to the dirty condition of the eggs. The nail-like objects around the truncate margin are no doubt micropyles; they are traversed by a canal, as can be very plainly seen in the specimens mounted in balsam. The curious funnel-like object and its contents are probably of a placental nature, but whether for use during the period previous to the deposition of the egg, or afterwards, is quite uncertain. The membrane or chitinous envelope of which the funnel is formed is of a very complex and peculiar structure, reminding one somewhat of the surface of a madrepore coral. Dr. Sharp said that an egg in many respects similar is figured by Dufour ('Récherches sur les Hemiptères,' pl. xiv., f. 165), but that in this figure the placental structure was absent. A large hole was represented in its place, so that it was probable that the peculiar structure might also be present in the egg of that species. Dr. Sharp also exhibited a specimen of *Pœcilochroma lewisii*, Dist., a Pentatomid bug from Japan, of a dull green colour, which, when damped with water, became almost instantly of a metallic copper-colour.

Mr. J. H. Leech exhibited a large number of Lepidoptera recently collected for him by Mr. Pratt in the neighbourhood of Ichang, Central China. The collection included about fifty-four new species of butterflies, and thirty-five new species of moths.

Mr. Elwes observed that he noticed only two genera in this collection which did not occur at Sikkim, and that the similarity of the insect fauna of the two regions was very remarkable. He added that about fifteen years ago, in a paper "On the Birds of Asia," he had called attention to the similarity of species inhabiting the mountain ranges of India, China, and Java.

Mr. M'Lachlan remarked that he had lately received a dragonfly from Simla, which had previously only been recorded from Pekin.

Mr. Distant said he had lately had a species of *Cicada* from

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Hongkong, which had hitherto been supposed to be confined to Java.

Mr. W. H. B. Fletcher exhibited a preserved specimen of a variety of the larva of *Sphinx ligustri*, taken in a wood near Arundel, Sussex.

Mr. W. White asked if the larva was normal in its early stage; he also exhibited drawings of the larvæ of this species, and called especial attention to one of a variety that had been exhibited at previous meeting by Lord Walsingham.

Mr. F. Du Cane Godman read the following letter from Mr. Herbert H. Smith, containing an account of the Hymenoptera, Diptera, Hemiptera, and Coleoptera he had recently collected in St. Vincent, where he was employed to assist the Committee of the Royal Society, appointed to investigate the Natural History of the West Indies:—

"Chateaubelais, St. Vincent, Nov. 6, 1889.

"Dear Mr. Godman,—I am able to report quite encouragingly of work on some groups of insects. We have latterly been paying much attention to the minute Hymenoptera, and the *Chalcididæ* are turning out very well; my lens is not powerful enough to separate the minuter forms satisfactorily, but there can hardly be less than 200 species. There are also a good many *Cynipidæ*, *Proctotrupidæ*, and *Braconidæ*; the latter are abundant in individuals, and there are a fair number of species. It is remarkable that this family should be so well represented, while the *Ichneumonidæ* are remarkably poor both in species and individuals. The paucity of all other Hymenoptera is very striking. There are not over twenty-five bees; if I remember rightly, only two *Vespidæ*, both of which may have been recently introduced; only five or six *Pompilidæ*, three or four *Sphegidæ*, about three *Bembecidæ*, and no *Crabronidæ*; only two or three minute and rare sawflies. The Keys, on the contrary, seem to be rather rich in the higher Hymenoptera.

"We have also added many to our collection of Diptera, nearly all small of course; latterly the *Muscidæ* are turning out many new species, and it would appear that the proportion of this family to the other Diptera will be as high as elsewhere.

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The small forms are so obscure and closely allied that I am no longer attempting to keep track of the species, but am just setting up whatever looks good; no doubt, collecting in this way, there will be many duplicates of some species, but you stand less chance of losing rarities.

"The Hemiptera, Homoptera, and Coleoptera are coming in slowly, but hardly a day passes without some novelty in these orders, and we still get new spiders occasionally. On the whole, counting the things already sent, I calculate that we can hardly have less than 2000 species of insects and spiders from this island, and the species are working up faster than even before, only there are hardly any large things. Perhaps the paucity of large species in my collection is not significant in itself; it arises partly from the fact that many groups containing showy species are not found here at all, or are very poorly represented; for instance, the Wasps, Butterflies, and *Bombycidæ* in Lepidoptera; *Reduviidæ* in Hemiptera; Lamellicorns, Longicorns, and *Buprestidæ* in Coleoptera; and all the *Odonata*. Then again, when there are few large species, I naturally collect the small ones more thoroughly. In the Orthoptera, I think the proportion of large species is greater than elsewhere; and in such families as the Weevils, Bees, *Pentatomidæ*, &c., which have a tolerable representation here, I think the average size will be as great as elsewhere in Tropical America. On the other hand, I think the proportion of small spiders is greater here than I have found it elsewhere, and some are extremely minute; one adult female, which I found with eggs,—a true spider,—is no larger than this [.].

"For the sake of an early comparison, I paid a man a few dollars to make me a collection of Spiders in Grenada. Taken with my collections from the Keys, these things from Grenada are extremely interesting, and not a little puzzling. The majority are like those of this island, but, as many are house spiders or common species that are widely spread, this does not stand for much. Four are new to me; one is an unusually large species of a genus found here; the others are representatives of as many very peculiar genera, which I have seen nowhere else in Tropical America. So far as this collection goes, there is not the slightest hint of a resemblance to the

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Keys; that is, the Keys lying between this island and Grenada has a fauna different from either, and, as I stated in my last letter, much more closely related to the fauna of Demerara. If you can explain this, I cannot. I might suppose that the Keys have been submerged, and subsequently repeopled, like volcanic islands, but, if so, why should the emigrants strike the Keys, and not St. Vincent or Grenada? It is true that a depression of 1500 ft. would cover all the Keys, while leaving St. Vincent and Grenada above water, but I am averse to such forced theories, unsupported by other evidence: besides, the barrier reefs and other features point to a depression still going on. Perhaps larger collections from Grenada will throw more light on this knotty point. A few spiders which a friend sent me from Barbadoes do not help the question, as they are all widespread species found here and in the Keys. The spiders seem to me particularly well adapted for studying problems of geographical distribution; for while a few kinds living in houses or along the sea-coast have become widely distributed, the majority do not readily cross water-barriers; I noticed this in the Amazons, where the river separated very many species. I am glad, for this reason, that my spider-collection from this island is so large; it will form an excellent basis of comparison with other islands. But for such studies, very thorough collections are necessary, else mistakes may be made. I noticed an instance to the point. Fronting the bay before this village there is a small island, at one point separated from the main island by a passage not more than seventy yards wide, and with a rock above tide-level in the middle. On this island I have on one or two occasions obtained a spider belonging to a genus found in Brazil and Mexico, but which I have not seen elsewhere on St. Vincent. It is, of course, possible that the species is confined to this little island, but it is extremely improbable. Found on one of the Keys, I might have taken this spider as an instance of the separation of the Keys zoologically from St. Vincent and their relation to S. America.

"By the way, though your St. Vincent collection will not be strong, it will, beyond doubt, be the most thorough one in Entomology ever made at one point in the tropics. And

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since I am to remain here another season, I wish, by filling up all gaps, to make the collection practically complete, that is, so nearly complete that it will give a definite idea of the fauna, with the proportionate representation of all the families. It seems to me that the cause of science will be better served by such a complete view than by any number of new species, and one island thoroughly worked up in this way will serve as a basis for comparison with all the others. The microscopic infusoria, &c., are of course out of the question, as they must be studied in the field by a specialist. But, beyond these, there are many things of more or less difficulty in preservation which I should like advice about.

"1. Planarians, slugs, and earthworms. — These are few, but ought to be noticed. Alcoholic specimens can hardly be studied; is there no means of preserving them?

"2. Internal parasites of birds, &c.—There are some curious ones also in insects, especially grasshoppers.

"3. Mites.—The larger ones can be preserved in alcohol very well, but there are numerous very minute ones; should these be mounted in balsam? Of course a full collection of mites is out of the question, but I might get a good representation.

"4. Thysanura, Poduridæ, &c.—I have preserved a few in alcohol, and they seem to do very well, but others would be likely to lose their scales. Sir John Lubbock would doubtless give you information on this point. The forms are quite numerous, and would be of especial interest.

"5. May-flies.—I have seen no large forms here, but quite a number of small ones. They shrivel more or less, and to some extent lose their colours in drying; shall I put them in alcohol?

"6. The winged forms are not very numerous, and I have dried a few successfully; the wingless forms, I suppose, can be preserved in alcohol, if we could tell the larvæ from adults.

"7. *Aphidæ*.—There are a few species; I can dry the winged forms; shall I put the wingless ones in alcohol?

"8. *Coccidæ*.—I can get the scales easily enough, but will these be enough to determine the species?

"9. Very delicate flies, as *Cecidomyidæ*.—The only trouble

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is their shrivelling. You will remember that I suggested drying these in partial vacuum of an air-pump; but though I believe this plan would be a good one, I have never tried it. I found in New York that the cheapest air-pump would cost four or five guineas, and I did not feel justified in going to so much expense merely for an experiment; still, if you wish me to try it, you might send me a cheap air-pump from England; the flies in question are quite numerous, and the air-pump plan might do also for *Psocidæ*, May-flies, &c. You can tell better than I whether the experiment is worth the expense; any air-pump that would exhaust half or two-thirds of the air ought to do.

"10. *Cynipidæ*.—I am getting many of these, but they are generally studied in connection with their galls. I will do what I can to breed them, but doubt if I should spend much time on it. The species appear to be quite numerous. I should also do what I can in breeding the Lepidoptera, as it really seems the only way of collecting them here. The real trouble, I think, is the wind; a calm night is almost a phenomenon here; the valleys, which elsewhere are the best places for moths, are here so many troughs for the land- and sea-breezes; I do not mean to say that I am getting no Lepidoptera, but the collection works up very slowly. To complete the collection of plants, I want to do what I can in the lower forms; and I once more beg that you will ask the Kew naturalists for information on this subject. I have already made a start with the Mosses, but am puzzled about the Fungi and Lichens. How can the Lichens be separated from rocks and preserved? As for Fungi, some kinds can readily be dried; should the others be preserved in alcohol? Finally, I might with very little trouble make valuable collections of Desmids and Diatoms, but should the *Confervæ* containing them be preserved dry, or in alcohol? Of course I do not expect to spend any time on these things, but it is so easy to get a little mud or moss now and then, and these may prove rich mines for microscopists. Please do not think that in mentioning all these things I am proposing to myself more work than I am able to do. All the groups I have mentioned would not increase my work very materially, but, with them,

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my collection would be practically complete in all but microscopic forms.

"Since I started this letter, I have added considerably to the collections of minute Hymenoptera and Diptera; the former especially seem to be exceedingly numerous; this is in accordance with what I have always said, that the Hymenoptera in the tropics are more numerous than the Coleoptera. Mr. Smith, my assistant, is doing very nicely in these minute things, and has already learned to set the little flies quite well. He wishes to go to Barbadoes about Christmas, and I propose to keep him there for two or three weeks collecting flies and spiders. I do not fancy that that island will repay much work, as the forest with which it was originally covered has all been cut away.

"A word about my setting of minute insects. I am quite satisfied with the method of mounting the small Diptera, as it is neat, secure, and puts them in good shape for study; but I am not so well satisfied with the little Hymenoptera; I mean the most minute ones, which are so tiny and hard that I cannot put them even on the point of a fine pin. I gum them to the points, and they look very well, only now and then I cannot get the wings free from the abdomen; still in a series of specimens there will hardly be any species in which the abdomen is concealed in this way. The real points of doubt are—(1) Will the minute portion of gum used be permanent, so that there will be no danger of the specimens falling off? (2) Will it not eventually corrode the point of the pin? The gum used is composed of sugar, tragacanth, and gum arabic; this I have found very permanent, having used it for ten years; and it sticks to the pin-points quite as well as to cards; I have thoroughly tested the specimens, and, when properly put on, they seem perfectly secure. I can think of no other method, except gumming them to cards, and it is impossible to do this without more or less daubing the wings and legs; besides, it takes much longer, and they are generally less secure in the end than by my method. I can use shellac for gumming them, but they cannot then be taken off the pin. Also I can use platinum wire for mounting them, as I have

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done with some, but it takes much longer to prepare the pins. The specimens I am now mounting are much neater than those I sent you. Please tell me if you think my present method will do, and will not risk the loss of types in future; it has the great advantage of celerity; I mounted over 150 before noon to-day.

"I am afraid this letter will cause you some trouble; but I am very anxious to give you a good return for the expense you are incurring, and my heart is quite set on giving you for once something like a complete collection from the tropics. I have no rseource but to consult you on doubtful points in my work. I expect to send on another lot of insects about the end of the year; also a fresh lot of plants.

"Yours faithfully,
"HERBERT H. SMITH."

A discussion followed, in which Mr. M'Lachlan, Dr. Sharp, Mr. Elwes, Lord Walsingham, and Mr. Distant took part.

Mr. Elwes read a letter from Mr. Doherty, an American, who had spent several years in remote parts of India, in which the writer described his experiences in collecting in the Naga Hills by means of light and sugar. Mr. Doherty expressed an opinion that light, if used in very out-of-the-way places, rather repelled than attracted insects; in fact, that they required to be accustomed to it, and that the same remarks applied to "sugar."

Colonel Swinhoe said that the attractive power of light depended very much on its intensity, and on the height of the light above the ground. By means of the electric light in Bombay he had collected more than 300 specimens of *Sphingidæ* in one night. Mr. J. J. Walker, R.N., stated that he had found the electric light very attractive to insects in Panama. Mr. M'Lachlan, Dr. Sharp, Mr. Leech, Mr. Elwes, Mr. A. J. Rose, the Rev. Canon Fowler, and others continued the discussion.

Papers read.

Mr. Lionel de Nicéville communicated a paper entitled "Notes on a new genus of *Lycænidæ*."

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Mr. F. Merrifield read a paper entitled "Systematic temperature experiments on some Lepidoptera in all their stages," and exhibited a number of specimens in illustration of his paper. He commenced by describing some experiments on eggs of *Selenia illunaria* and *illustraria*. These began to suffer after about four weeks' exposure to a temperature of 33°, and none survived it sixty days; nearly all of those which died matured after removal from the ice sufficiently to form the larva within the egg-shell, but they were unable to break through. Next, experiments on growing larvæ of *illustraria* were described. All died within three weeks of exposure to a similar temperature; but some lived sixty-three days at a temperature of about 47°, feeding slowly, and some of them finally pupating; the older larvæ seemed to withstand the cold best. Larvæ of *E. autumnaria* and *E. alninaria* were much injured by the high temperature of 90° to 100°. Experiments were tried on pupating larvæ and pupæ. Preliminary trials showed that larvæ of the summer-pupating brood of *illustraria* would pupate at 33°, occupying five or six weeks in making the change, instead of two or three days, without being injured by the process. Larvæ of *autumnaria* and *alniaria* would pupate at 47° or lower, and that temperature did not appear to injure the soft, green pupa of either species, unless continued for very many days. *Illustraria* pupæ seemed injured by cold when the last day or two's changes before being ready to emerge were proceeding, but not when these changes were over, and the moths were only awaiting the proper time of day when they would emerge uncrippled at a temperature of 47°. A brood of *autumnaria* larvæ from a single pair was divided; some were forced (80°) as larvæ and as pupæ, others forced as larvæ cooled (47°) as pupæ; others were fed at the ordinary temperature (averaging 65°) as larvæ, and of their pupæ some were left at that temperature, others forced, and the rest cooled or iced. All the pupæ at 33°, 47°, or 65° produced moths that were dark, and much spotted; all the forced pupæ produced moths pale, and practically spotless; it seemed to follow that the dark "British" *autumnaria* was not a dark race, but consisted of individuals of which the pupæ had been exposed to a tempe-

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rature of 65° or less. *Alninaria* pupæ endured cold better than *autumnaria*, two moths in perfect condition having emerged after exposure to 33° for fifty days; the effect on the colouring was slight, but in the direction of greater darkness. Eighty-seven summer pupæ of *illustraria* from a single pair were taken; fourteen of them were left at the ordinary temperature, and emerged in something less than a fortnight; the rest were iced (33°), and taken out at periods successively lengthened by two weeks till twenty weeks' icing had been reached, and there were enough pupæ left for twelve or fourteen weeks more. There was a difference in colour, increasing (but not regularly) as the period of icing was lengthened, a general warm brownish hue prevailing, with an increase of darkness. There was a striking difference, caused by the icing, in the markings; the sinuosities and angles that mark the outer edge of the dark inner part of all the wings being straightened out, the acute angle on the costa giving place to an obtuse angle, and the outer edge forming a nearly straight line from the costa continuously across both wings, and, on the posterior wing, turning at a sharp angle towards the abdomen, so that the shape of the dark inner part of the whole insect approached a half-hexagon, instead of a half-circle. There was in this change of colour and markings a general approximation to the colour and markings of the natural spring emergence.

Vigour seemed in no way affected by icing for twenty weeks this pupa, which usually lived for about two weeks at a temperature not lower than 65°. The reverse experiment —forcing or even keeping at a temperature of about 60° the autumn pupa—had a very much more injurious effect; the great majority so treated died; those that emerged first were much nearer the summer than the spring type in colouring, but they grew darker (not regularly) as the time in pupa was protracted, and some that were after some weeks of this treatment exposed to cold wintry weather for about six weeks were much darkened in colour. The experiments seemed to show that, by forcing, the *larva* of *illustraria* might generally be made to assume absolutely the summer form, the *pupa* only partially so, and with difficulty, and much loss; but that by icing. the *pupa* of the summer form might without any

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difficulty or loss be made to assume a form approaching that of the spring emergence, but different from it. In both this double-brooded insect, and the single-brooded *autumnaria* and *alniaria*, the effect of cooling or icing the pupa was to darken the colour of the moth. The imago of the summer brood of *illustraria* became very weakly after fifty-five days' icing, but six out of seven survived icing for that period. The experiments proved conclusively what had been suspected last year, that in *autumnaria* the male was habitually longer in the pupal state than the female; in the forced pupæ no male was less than 16½ days, no female more than 15 days, the average period in the male being 17 days, in the female 14½ days; in *alniaria* the male averaged 4 days more than the female. In some summer *illustraria* the male pupal period averaged 12·2 days, the female 10·6 days. There appeared to be a very slow progress of development during the icing period, 120 days in the latter representing perhaps 2 or 3 at the ordinary temperature. Some incidental observations were added as to the deterioration of *illustraria* by breeding; this was not noticed until the third generation, and had been reversed in some cases where eggs were sent to Wimbledon, and produced moths considerably larger than their parents; the causes were obscure, and rather pointed to the desirability of a change of diet in successive generations. The experiments did not lend any support to the view that *illustraria* could pass a long winter in any other than the pupal stage.

Lord Walsingham observed that it appeared that exposure to cold in the pupa-state produced darker colouring in the imago, and that forcing in that stage had an opposite effect; that insects subjected to glacial conditions probably derived some advantage from the development of dark or suffused colouring, and that this advantage was, in all probability, the more rapid absorption of heat. He said he believed that an hereditary tendency in favour of the darker forms would be established under glacial conditions, and that this would account for the prevalence of melanic forms in northern latitudes and at high elevations.

Mr. Elwes, Mr. Jenner Weir, Dr. Sharp, and others continued the discussion.

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ANNUAL MEETING.

January 15th, 1890.

The Right Hon. Lord WALSINGHAM, M.A., F.R.S., President, in the chair.

An abstract of the Treasurer's accounts was read by Dr. Sharp, one of the Auditors.

Mr. H. Goss, one of the Secretaries, read the following:—

Report of the Council.

In accordance with the Bye-Laws, the Council begs leave to present the following Report:—

During the year 1889 four Fellows have died, *viz.*, Mr. Frederick Bond, Colonel C. J. Cox, Mons. J. C. Puls, and Dr. Victor Signoret; two Fellows have resigned; four Fellows have been struck out of the list for non-payment of their subscriptions; and twenty-four new Fellows have been elected.

The number of Fellows elected during the year, although above the average, is not so large as it should have been. With the exceptionally low subscription of £1 1*s.* a year, the Society is in need of a much larger number of Fellows to enable it to publish more papers, and in other ways to advance its interests and promote its objects; and the Council again begs leave to urge the Fellows to do their utmost to induce their friends to join the Society, and thus increase its revenue.

At the present time the Society consists of an Hon. Life-President, 10 Honorary Fellows, 48 Life Fellows, and 258 paying the Annual Subscription, making the total number of Fellows now on the Society's List 317, which, after allowing for the losses by deaths, resignations, and exclusions, is an increase in number of 14 since the date of the Annual Meeting last year.

The Transactions for the year 1889 form a volume of 592 pages, containing 28 memoirs contributed by the following 20 authors, *viz.*, the Right Hon. Lord Walsingham, F.R.S.; Dr. Sharp (2 papers); the Rev. F. A. Walker, D.D.; Mr. Frederic Merrifield; Mr. J. H. Leech, B.A.; the Rev. T. A.

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Marshall, M.A.; Mr. C. J. Gahan, M.A.; Mr. W. Warren, M.A.; Mr. J. S. Baly, M.R.C.S.; Mr. Gervase Mathew, R.N.; Mr. H. J. Elwes (2 papers); Mr. Lionel de Nicéville; Mr. G. A. J. Rothney; Mr. A. G. Butler (2 papers); Mr. J. B. Bridgman; Mr. G. T. Porritt; Mr. W. F. Kirby; Mr. Edward Meyrick, B.A.; Mr. George T. Baker; and Mr. F. P. Pascoe. Of these 23 papers 14 relate to Lepidoptera (or to enquiries in which Lepidoptera were the subjects of experiment), 4 to Coleoptera, 4 to Hymenoptera, and 1 to the subject of the vision of Insects and other Arthropods.

The memoirs above referred to are illustrated with 17 plates, of which 14 are coloured. The Society is indebted to Lord Walsingham for the entire cost of Plates I., II., III., IV., V., and VI.; to Mr. J. H. Leech for the cost of colouring Plates VII. and IX.; to the Hon. Walter de Rothschild for the entire cost of Plate XII.; and to Mr. F. P. Pascoe for the entire cost of Plates XVI. and XVII.

The Proceedings, containing an account of the exhibitions and discussions at the Meetings, in addition to several papers not published in the Transactions, extend to over 60 pages.

The financial position of the Society is satisfactory, although the expenses during the year have been exceptionally heavy. More available space being required for Books in the Library, a sum of £18 13*s.* has had to be expended on new shelves. One of the two Compositions received in lieu of Annual Subscriptions has been applied towards defraying this expense, and the other has been invested, leaving a balance in hand of £18 4*s.* 8*d.*

During the past year upwards of 150 Books, Pamphlets, Journals, and Papers have been added to the Library; the average number of Fellows attending the Meetings has been greater than in any previous year of the Society's existence; there has been a gain of 14 new Fellows; a Composition has been invested, thus increasing the Society's capital by £15 15*s.* since the last Annual Meeting, and raising the total sum invested to £411 4*s.* 4*d.*; and there is a good balance in hand.

The Council therefore has reason to congratulate the Fellows on the progress made by the Society during the year 1889.

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The following is an Abstract of the Receipts and Payments during 1889:—

Receipts.	£	s.	d.
Balance in hand 1st Jan., 1889	27	12	7
Contributions of Fellows	329	14	0
Sale of Publications	89	17	11
Donations	22	3	6
Interest on Consols	11	1	8
	£480	9	8

Payments.	£	s.	d.
Rent, Office Expenses and Salary to Assistant-Librarian	162	19	1
Printing	210	7	1
Plates, &c.	66	14	2
Books, Binding, &c.	6	9	8
*Balance	33	19	8
(* Of this Balance, £18 4s. 8d. remains in hand, and £15 15s. has been invested.)			
	£480	9	8

11, Chandos Street, Cavendish Square, W.,
January 15th, 1890.

The Secretaries not having received any notice proposing to substitute other names than those contained in the lists prepared by the Council, the following Fellows constitute the Council for 1890:—Joseph W. Dunning, M.A., F.L.S.; Henry J. Elwes, F.L.S.; the Rev. Canon Fowler, M.A., F.L.S.; Frederick Du Cane Godman, M.A., F.R.S.; Herbert Goss, F.L.S.; Ferdinand Grut, F.L.S.; P. Brooke Mason, M.R.C.S., F.L.S.; Prof. Raphael Meldola, F.R.S.; Edward Saunders, F.L.S.; Richard South, F.E.S.; Henry T. Stainton, F.R.S.; Roland Trimen, F.R.S.; and the Right Hon. Lord Walsingham, M.A., F.R.S.

The following are the officers elected:— *President*, the Right Hon. Lord Walsingham; *Treasurer*, Mr. Edward Saunders; *Secretaries*, Mr. Herbert Goss and the Rev. Canon Fowler; *Librarian*, Mr. Ferdinand Grut.

The President then delivered an Address, at the conclusion of which Mr. Stainton proposed a vote of thanks to Lord Walsingham for his services as President during the year, and for his Address. The proposal was seconded by Prof. Meldola, and carried unanimously.

A vote of thanks to the Treasurer, Secretaries, and

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Librarian was moved by Mr. H. J. Elwes, seconded by Dr. Sharp, and carried.

Mr. Goss, Canon Fowler, and Mr. Grut severally replied.

Abstract of Receipts and Payments for 1889.

Receipts.	£	s.	d.	Payments.	£	s.	d.
Balance 1st Jan., 1889	27	12	7	Rent, Salary to Assistant-Librarian, & Office Expenses	162	19	1
Subscriptions "	244	13	0	Printing - - -	207	14	1
Entrance Fees "	37	16	0	Plates, Colouring, &c. -	69	7	2
Arrears "	15	15	0	Books, Binding, &c. -	6	9	8
Compositions "	31	10	0	Investment - -	15	15	0
Donations "	22	3	6	Balance in hand	18	4	8
Sale of Transactions	89	17	11				
Interest on Consols -	11	1	8				
	£480	9	8		£480	9	8

ASSETS.

								£	s.	d.
Subscriptions, considered good - - - - - - -								10	10	0
Consols - - -	£395	9	4	(cost)	377	4	0			
Invested in 1889 -	15	15	0	"	15	14	0			
	£411	4	4		£392	18	0			

LIABILITIES.

(Nil.)

Audited and found correct, January 8th, 1890.

R. McLachlan.
Osbert Salvin.
J. Jenner Weir.
David Sharp.
Ferdinand Grut.

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THE PRESIDENT'S ADDRESS.

Gentlemen,

I am uncomfortably aware that, although I have myself frequently derived valuable instruction from my connection with this Society, I cannot hope to be able to impart to those who habitually attend our meetings any new information, or to record any observations which are likely to be credited with the charm of originality by those who for the most part devote far more time and attention to entomological study than I have ever done.

I shall therefore make no such ambitious attempt upon this occasion, but shall rather endeavour to apply my remarks to the general subject, and with a view to reach not only beyond this room, but, if possible, even somewhat beyond the range of this Society, to illustrate some of the difficulties which surround the study of Entomology, as well as the charms by which it attracts its votaries. Although to my present audience it is not surprising that anyone with a love for investigation, or with any degree of curiosity as to the laws which regulate the production and variation of natural objects should be interested in the study of insects, we must all admit that to the majority of the men and women we meet in every-day life it seems unaccountably strange that anyone gifted with an average degree of human intelligence should devote any considerable share of time or attention to collecting and observing the lower forms of life. From the point of view taken by such unqualified critics, the attractive beauty of some of the larger diurnal Lepidoptera, or the brilliant metallic colouring of the *Cetoniadæ* and other families of Coleoptera, are alone worthy of appreciation. They cannot deny the useful influence that such magnificent examples of

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the wealth of design in nature may have upon artistic taste; the consequent refinement and increased enjoyment of life, so far as it is dependent upon luxurious culture, appeals to their minds in an intelligible manner; but when the studies of entomologists lead them to regard with interest the most minute and inconspicuous insects, such apparent waste of energy passes the comprehension of the uninitiated. When collecting in California many years ago I was frequently asked, "But how do you make it pay?" Our too attractive and engrossing study needs no defence here, but before referring to another phase of the subject, I may, perhaps, be allowed to mention a few of the more apparent advantages which are to be derived from it.

As an illustration of the too often questioned practical usefulness of entomological studies (among many instances), I cannot refer to one more striking than the successful importation of the Australian parasites infesting the scale-insect, *Icerya purchasi*, which has proved so noxious to the orange plantations in California. From the moment it was recognised that this scale-insect was of Australian origin, Dr. Riley conceived the idea of studying its life-history in its native habitat, and availing himself, if possible, of such information as could be collected about its natural enemies. In 1887 Mr. Koebele, and in 1889 Mr. F. M. Webster, were sent out to Australia for this purpose, and succeeded in shipping various consignments of the dipterous and hymenopterous parasites, as well as predaceous Coleoptera, which they found attacking the *Icerya* there. These, after some failures, were successfully introduced into California, and, under the care of Mr. Coquillet, various experiments were carried out, proving that the ladybird, *Vedolia cardinalis*, was the most active and efficient of its enemies. By the 12th of June, 1888, 10,555 of the imported ladybirds had been bred and distributed at the experimental station at Los Angelos, and in nearly every one of the 208 different colonies thus established their acclimatisation has proved successful. They have now spread very widely, and instances are recorded where the oranges and other trees hitherto thickly infested with this noxious scale have been practically cleared of *Icerya* by their aid.

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I might also refer to the successful fertilisation of red clover in New Zealand by the importation of impregnated queens of our common humble-bee; to the re-discovery of the fact, first noticed by Francis Walker in 1848, of the migrations of Aphides, or plant-lice, from one food-plant to another at different stages of their development, enabling them to be more successfully pursued and exterminated, —another feather in the already well-decorated cap of our distinguished colleague Dr. Riley,—and to the uses to which the silk produced by various exotic species of *Bombycidæ*, other than our common silk-worm, has now been successfully applied.

Many other conspicuous instances in Economic Entomology could be mentioned, if time permitted me to enlarge upon this portion of the subject.

The artificial breeding and rearing of Lepidoptera in captivity must always prove a valuable auxiliary to the study of the laws of heredity, protective resemblance, and natural selection. The elaborate work of Weissmann, Poulton, and many others has already been the means of eliciting much interesting evidence on these subjects, and we may hope that the time will come when organic chemistry in relation to changes of colour may be so well understood that some connection may be established between the various analogous phenomena so constantly observed in different sections of the animal and vegetable kingdoms. Should it ever be discovered by what precise method certain spiders can adapt their tints to those of the objects on which they rest, or certain larvæ can, as it were, partake of the colour of their food-plants, it will yet remain to be shown whether the same laws affect the assimilation of fishes and lizards to their surroundings; or the correspondence of autumnal leaves to the ripened fruit of red and yellow gooseberries respectively; or, as has lately been suggested, the prescient arrangement of the material of its nest by the red-backed shrike according to the colour of the eggs to be deposited.

Colour, in the sense in which we understand it, can surely be neither infectious or contagious, but if the laws of organic chemistry, which govern it, should ever come to be well

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understood, the part which the study of insects will have played in arriving at that state of knowledge should certainly be not inconsiderable.

The investigation instituted by Mr. Francis Galton with a view to determine the percentage of hereditary transmission to successive offspring by different generations of predecessors, whatever may be the final results, whether negative or positive, of Mr. Merrifield's experiments, is an acknowledgment of the value for such purposes of the means which entomologists have at hand for following the life-history of very numerous generations within a comparatively short space of time, whereas in other branches of Zoology such an investigation might be almost hopelessly prolonged, costly, and inconvenient.

Although the value of Entomology as a means of throwing light upon many interesting problems now occupying a foremost place in scientific investigation must be generally acknowledged, I will add one further illustration to my argument. The majority of known insects being phytophagous, their occurrence in or absence from certain defined areas of the globe should frequently enable us to check the conclusions of botanists and zoologists with regard to the progress of geographical distribution, for whereas the seeds of plants are easily conveyed by rivers and marine currents, by hurricanes, or by the instrumentality of birds and animals, the insects which feed upon those plants being often of very delicate structure and of inactive habits, are less easily transferred from place to place, and by no means generally accompany their native food-plants in the march of natural or artificial acclimatisation. It is remarkable how many insects continue to be exceedingly local in their occurrence, although precisely similar conditions of food and climate may prevail at no great distance from the limited districts they are known to frequent. On the other hand, when we find local genera, and perhaps even species, occurring in West Africa and on the opposite coast of South America, those who believe in the submergence of Atlantis may perhaps claim that such species must have been distributed to east and west from their original habitat on an interjacent continent. To estimate the possible value

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of such evidence a single instance will suffice. The numerous varieties of *Eucalyptus* characteristic of the flora of the Australian region afford nourishment to a large number of very distinct species of Micro-Lepidoptera, notably of the family *Œcophoridæ*; although these trees have now been largely introduced in the South of Europe and in other parts of the world, not a single Australian insect, so far as I am aware, has at present been found to accompany them—indeed, beyond their native country they enjoy a singular immunity from insect-attacks, which, if it should continue, may perhaps afford to future generations additional evidence of their artificial introduction.

It is very frequently stated that the increasing love of collecting natural objects within the United Kingdom leads not only to the discovery of rare and local species, but also to their rapid extermination, and this is unfortunately too true as regards the larger and more conspicuous forms. It applies, perhaps, more especially to birds and plants, but, although a few scarce insects may thus become more difficult to obtain in certain known localities, the area of land not open to the general collector is always so considerable as to insure the probability of their survival and subsequent re-distribution, and some individuals of the smaller and more obscure groups may always be trusted to escape observation, and to continue to propagate their species under suitable conditions. Thus, however closely any particular district may be explored, there is always an inducement to further search in the possibility that some unnoticed rarity may yet be discovered or re-discovered. Moreover, the transformations and life-histories of many of even the commonest species are still very imperfectly known, and this is an additional source of interest, a subject for useful investigation and original observation.

For these reasons Entomology must always be, as it undoubtedly is at this time, not only a useful but a popular study, and must contribute, perhaps, more than any other to the enjoyment and recreation, mental and physical, of those dwellers in towns who possess a true appreciation of the pleasures and interests attaching to country life. I think it would be difficult to over-estimate the civilising and refining

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effect which a day in the country with the object of gaining an insight into the marvels of natural creation, none the less wonderful because in themselves common and widely distributed, must have upon the minds and characters of all who seek such enjoyment. The number of naturalists' field clubs and associations throughout the country, especially in connection with public schools, young men's Christian associations, and mechanics' institutes, is increasing every year; the scientific and learned societies dealing with biological study may be estimated approximately at scarcely less than 800. Who will deny that the hundreds of thousands of members of such associations are thus afforded the means of escaping from that fog of ignorance and narrow-mindedness which, through no fault of their own, too often settles down upon the habitual dwellers in our great manufacturing towns, mimicking, as it were, the atmospheric conditions in which they are condemned to pass their lives.

If the study of Entomology, looked upon as a mere "hobby," sport, or pastime, can claim to have conferred no greater benefits upon the human race than to have afforded to a not inconsiderable section of our urban population an inducement to improve their minds and recreate their bodies, it will have contributed in no small degree to the sum of human health, happiness, and morality. I hope our experience may enable most of us to endorse the statement of the Abbé Umhang, in his obituary notice of Henri de Peyerimhoff in 1876:—"J'ai connu plus d'un jeune homme qui s'est passionné pour une branche de l'histoire naturelle, et je n'en ai vu aucun s'écarter du chemin de la vertu et de l'honneur."

For the very reasons to which I have briefly alluded it must be admitted that of all branches of systematic zoological study Entomology presents the greatest difficulties, and involves the greatest necessity for constant application and careful work. The fact that rare or obscure species can be easily overlooked, and the facility, nevertheless, with which vast numbers of specimens can be obtained, whilst they enhance the pleasure to be derived from field-collecting, combine to increase the labour involved in classification and arrangement, and make it impossible for the cabinet

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naturalist to keep pace with the efforts of his brothers of the field. I believe that few, whether they be students or professors of Biology, are accustomed to bear in mind the vast extent and rapid extension of the study of insect-life. If they be themselves specialists in other branches, they are too often apt to gauge entomological work by the standard of their own researches, whether among mammals, birds, fishes, reptiles, molluscs, or plants.

To many who have not attempted to analyse the subject, the comparatively slow progress of our special study may appear to require explanation and apology. When great scientific expeditions have been undertaken, or when energetic private or professional collectors return from new fields of exploration, and the results of their collecting are distributed to different museums or handed to specialists to be worked out, mammals, birds, plants, reptiles, fishes, and probably also shells are dealt with in a reasonable space of time: known species are compared and recorded, new ones are described and characterised, and all drop into their places in the general system, subject to such revision as may be shown to be needed from time to time as fresh material comes to hand. But it is complained, and the fact must be freely admitted, that too often the majority of the insects thus obtained remain for years in the boxes in which they have arrived, and are not described, classified, or incorporated in any systematic manner until long after those who collected them have ceased to take an interest in their identification.

Botanists, ornithologists, and others frequently express their surprise that this should be so, and are perhaps induced to regard it as evincing a dilatory spirit on the part of entomologists. Many points connected with this subject have, I think, been overlooked not only by the general public, but by many of our diligent workers in Biology. In the first place, what is the comparative position occupied by Entomology with regard to other branches of biological science? What is the extent of the field of labour which it presents? How far has that field been explored? What is our present rate of progress, and the work that remains to be done? Some attempts have been made from time to time to arrive at the

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number of species of true insects of all orders existing on the face of the globe. Dr. John Davy, in a letter to W. Spence, in 1853, estimates that 250,000 species of insects exist (Tr. Ent. Soc. (n. s.), III., p. 32). The latest of these calculations is, perhaps, that of my predecessor in this chair. At a meeting of the Dumfriesshire and Galloway Natural History Society, held at Dumfries in 1883, Dr. Sharp said:—"As the result of a moderate estimate it appears probable that the number of species of true insects existing at present on our globe is somewhere between 500,000 and 1,000,000," and expressed his own opinion, in which I entirely concur, that "the number probably exceeds the higher of these figures, and will come near to 2,000,000." Dr. Sharp has been good enough to give me the approximate number of distinct species of Coleoptera described up to the present time; he puts these at about 120,000, basing his calculation upon the Munich Catalogue, published in 1868, which contained 77,000 species, and upon the additional descriptions since published.

Admitting that such calculations can be only approximate, I have worked through the pages of the Zoological Record with a view to arrive at the proportionate amount of descriptive work done in each year in the different branches of Zoology. I find that the average number of pages occupied in the Record during the 24 years of its publication is 273 for Insecta, to 369 for all other branches of Zoology taken together, or, in other words, that 42¼ per cent. of the record of all zoological literature is occupied with insects against 57½ per cent. devoted to other subjects; Aves representing about 9¼ per cent., Mollusca and Molluscoida 14¼ per cent. Taking a fairly average volume of the same publication, the volume for 1882, I find that the new species of insects described in that year, deducting 8 per cent. for synonyms, amount to 5600, whereas the whole number of new species described in other branches, with the same deduction, comes out at about 1650, of which Mollusca are 772, Pisces 239, Crustacea 205, leaving 434 only for the whole remainder of terrestrial Zoology. This in itself is sufficient evidence of what I may call the infancy of our knowledge of the subject.

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It must, of course, be remembered that the description of an insect does not necessarily involve any great amount of labour; a fish, an echinoderm, or a sponge, may require most careful preparation and dissection before its specific characters can be fully recognised, whereas for the most part the structural and superficial characters of insects are easily distinguished and described, although the precise details of neuration in Micro-Lepidoptera are not always easy to arrive at, even by bleaching; but what I desire to point out is the immensity of the field of study, and the degree of ignorance on the subject, which is evidenced by the vast number of species hitherto unobserved which are annually recognised and added to the general lists. The prevailing impression among the uninitiated is that at least within the British Islands there is nothing new to be discovered. A man who is known to possess a good collection of British insects is generally supposed by his friends to have every species that can be found. It would astonish the unentomological public to be told that a Fellow of this Society recorded, in a single paper, in the 'Entomologist's Monthly Magazine' for January, 1886, the occurrence of no less than 100 species of Diptera not hitherto recognised in England, and Mr. Verrall informs me that he would at this moment be able to describe at least a hundred additional British species belonging to a single family, showing that the study of Diptera, even as limited to the British Islands, is by no means far advanced.

The bulk of the record has been much increased during the last ten years, and the proportionate number of pages for general Zoology has been somewhat greater than in the preceding period; this is chiefly to be attributed to the working out of the 'Challenger' collections, which, for obvious reasons, were exceptionally rich in marine Zoology, and deficient in insects.

The Hessian Fly affords an excellent illustration of how a minute insect, however common, may be overlooked for many years; for whether this species did, or did not, occur in the days of the older economic entomologists, about which much difference of opinion exists, it must, I think, be admitted that its introduction cannot be dated within the

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last ten or fifteen years. I have a letter from Lord Montagu, in which he says that the Hessian Fly has been known on his estate (Beaulieu) for many years, and that the farmers designate its ravages by the term "weak-stalk." Dr. Riley's chief argument for its comparatively modern introduction is based upon the impossibility that men like Kirby, Curtis, and Westwood could have overlooked it; but in 1856, our great economic entomologist, Curtis, then President of this Society, commenting upon Mr. Stainton's announcement of the discovery, for the first time, of the smaller genera of *Tineina* in tropical countries, expressed his doubts whether Micro-Lepidoptera would be found so plentiful in tropical countries as Mr. Stainton anticipated, and why? because even in the South of Europe, through which, in company with Mr. Walker, he made a tour some years before, although they collected diligently and sought especially for Micro-Lepidoptera in places similar to those in which they were plentiful in England, yet out of more than six thousand specimens of insects they brought home, the number of small moths was *very few*. Knowing the vast number of South-European species that have since been described by Staudinger, Zeller, Stainton, Millière, Constant, Ragonot and others, and bearing in mind also the very limited amount of damage done to our crops by the Hessian Fly as compared to its ravages in America, is it unreasonable to believe that it may easily have been unobserved for a much longer period than has been generally supposed, and that Curtis himself may not improbably have overlooked it? With the amount of new material annually coming to hand, it is not surprising that the difficulties to be overcome in laying down the lines of a satisfactory classification of the numerous families and genera of insects are at present very great. In the case of Coleoptera these have been more or less successfully encountered, but the hard chitinous structure of the various parts of beetles has afforded facilities which are not available in dealing with the more fragile forms comprised in the orders of Lepidoptera and Diptera, and to this, and the facility with which they are collected, we may fairly attribute the large preponderance of

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known species over other orders of insects, rather than to any actual superiority in numbers. Dr. Staudinger, in the Introduction to his 'Catalogue of European Lepidoptera,' says that no problem in Zoology seems to him more difficult to solve than that of establishing a good classification of Lepidoptera; indeed, he says it seems to him seriously unsurmountable, on account of the insufficiency of our knowledge of these creatures. He points out that any system founded upon a fauna limited to any geographical region, must be insufficient, and it is certain that up to the present time our knowledge of all other than Diurnal Lepidoptera is exceedingly partial, when considered in its relation to the geographical area of their distribution.

Another method of arriving at an approximate estimate of the extent of the field of Entomology and of its relation to other branches of biological study, is to examine the records of scientific expeditions and faunistic research, but these are for the most part very misleading, inasmuch as they depend for their results upon the taste, knowledge, and inclination of the different members of the staff employed, and are in few cases, except over very limited areas, fairly and equally representative of all branches of study. The only systematic investigation of the fauna of any considerable area of the globe, which can be in any sense regarded as approaching completion, and as affording the necessary data for comparison, is to be found in the 'Biologia Centrali-Americana' of Godman and Salvin. It is no small honour to this Society that the authors of such a work should have been both members of our Council during the past year. Although it can hardly be said that no branch of Natural History has been neglected in this instance, the care with which all the more important orders have been worked up affords fair ground for comparative estimates.

The area included in this laborious and carefully conducted investigation amounts to about 900,000 square miles, or about one 57th part of the whole surface of land on the face of the globe, and may be taken to be an area fairly representative of the comparative distribution of

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the higher and lower forms of life. I am indebted to my friends the authors for the following figures:—

In Coleoptera		
the species already dealt with in the Biologia are	10,916	
not yet dealt with	4498	
the *approximate total number always subject to be increased by additional discoveries: including about* 8,800 *new species and* 860 *new genera*, are thus		15,414
In Lepidoptera		
the species already dealt with are	2328	
not yet dealt with	4372	
Total number subject to further increase: including about 3250 *new species*		6700
In Hymenoptera		
the species already dealt with are	1183	
remaining to be dealt with	2817	
subject to very considerable increase, as the Hymenoptera are generally supposed to equal the Coleoptera in numbers		4000
In Diptera		
total number of species to hand are at least ..... of which about one-half are new. These are also a mere fraction of the total number of species existing which may possibly be equal to the Coleoptera or to the Hymenoptera.		1000
In Hemiptera		
a fraction only of the Heteroptera amounting to about	2000	
and of the Homoptera about	1000	
1600 of which are probably new, bring the list of known, if not all described, species of insects in that very limited portion of the globe to no less than		3000
leaving the Orthoptera and Neuroptera at present untouched; the proportion of new species throughout being at least 43 per cent.		30,114
Comparing these figures with the numbers of mammals, birds, &c., from the same area we get—		
Mammalia		180
Aves		1600
Reptilia		157
In this total a proportion of less than 5 per cent. are new.		1937

An estimate of about 1000 species of Arachnida would raise the proportion of novelties considerably, this branch of

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the subject having been less generally studied; but as regards the number of species, general Zoology, even with this addition, reaches only about one-seventh of the total reached in Entomology. It must be remembered that this work deals with terrestrial Zoology and Botany only.

We have in these figures abundant evidence that the whole field of zoological research apart from Entomology is but small as compared to that in which the Fellows of this Society are interested, and when we see that in Central America one small family of the Coleoptera, the *Hispidæ*, exceed the whole of the Mammalia, and moreover that in another small family, the *Cistelidæ*, among 150 species as worked out by Mr. Champion, no less than 148 are new to science, we may well ask ourselves who can venture to assume the appellation of "Entomologist"? or even of Lepidopterist or Hymenopterist. As in political life we are gradually becoming accustomed to speak of the Honble. Member for East St. Pancras, or of the South-Western Division of the East Riding of Yorkshire, surely our successors in this Society must one day be content to be called Pieridists, Gelechidists, Hispidists, or Cicindelidists, according to their different branches of study.

Now it is obvious from these, and from the figures I have quoted from the 'Zoological Record,' that as compared with general zoologists, entomological students have before them the burden and heat of the day. If we are ever to arrive at a reasonably complete idea of the sequence of genera and species in the world of insects, we have to do far more than has ever been done or will ever have to be done by other zoologists. If we take Dr. Sharp's estimate of 2,000,000 for the total number of insects on the face of the globe,—and I venture to think that the time may come when that estimate, already the double of any previous conjecture, may be yet increased by further investigation and more perfect knowledge of the minute forms in each order,—we have the number of distinctly recognisable species of insects reaching twenty times that of all other vertebrate and invertebrate living creatures at present known, and to which the additions can never approach those which have yet to be

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made to Entomology. Mr. Bowdler Sharpe advises me that Birds may be taken roughly at 12,000 already described species, Mammals may probably be taken at less than 3000, Mollusca at about 50,000, and so on, and although such estimates can be merely approximate, I claim that the proportionate importance of the different groups in point of numbers will be found to be not very wide of the mark. If there are 2,000,000 species of insects in the world, of which only some 200,000 are at present described, according to the present rate of progress, or adding 5,600 in each year, it would take 340 years to describe the remaining 1,800,000. I am aware that Dr. Sharp, in his Address to this Society in 1888, put the annual additions at a much lower figure, and asked for an allowance of 1000 years to complete the lists; but I think the rate of progress has been greater than he supposed.

It must surely occur to my hearers that such work can never be successfully undertaken by private enterprise or detached and unsystematic efforts, however large may be the number of faithful and devoted workers. Organisation and resource are required for carrying on the necessary investigations and for placing the results from time to time in such systematic sequence as will enable students not only to have access to, but, as it were, to digest and assimilate the information necessary to enable them to pursue their own special lines of enquiry.

We naturally turn to the great educational and scientific institutions of the country for that methodical assistance which their means of accumulating and arranging materials for study should enable them to afford.

The only Government establishment in which such work has been, or can be, suitably undertaken, is the British Museum. It may be useful to consider what has hitherto been done there—what is the quantity and quality of the work expected of it by the public, and what are the means at its disposal for dealing with such work, present and prospective.

The value of the vast entomological collections in the National Museum can scarcely be overrated, containing, as they do, an enormous percentage of the actual types from which the leading authors on the subject during this and the last century have made their descriptions.

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It would be impossible in a few words to give any idea of the extent of these collections, but they include valuable contributions from the cabinets not only of Sir Hans Sloane, of Petiver, Banks, Hunter, and Leach, but of Darwin, Stephens, Vigors, Bates, Bowring, Desvignes, Buckler, Baly, F. Smith, E. Saunders, Sir S. Saunders; of Grote, Zeller, Hewitson, Braasche, Wollaston, Godman, and many others; with many typical specimens described by Linné, Fabricius, Drury, Kirby, Spence, Haliday, Donovan, Curtis, Walker, Gyllenhal, Imhoff, Saunders, M'Lachlan, Waterhouse, Westwood, Newman, Latreille, Olivier, Candèze, Mulsant, Wallace, Deyrolle, Hewitson, Zeller, Grote, and Butler.

It would be difficult to make even an approximate guess at the number of specimens or species in the Entomological Department, and the number of types could only be got at by counting them in each separate drawer, which would involve much time and labour.

I have obtained, through the kindness of Dr. Günther, an account of the number of specimens added in the different departments of Zoology during his keepership, and taking, for convenience, a decade from 1877 to 1886, I find that 197,824 insects of all orders were received into the Museum during that time, or something approaching 20,000 specimens a-year, Lepidoptera and Coleoptera heading the list with 89,506 and 80,841 respectively. The figures would undoubtedly be very much higher if this branch of science were further advanced in system and method. Such advancement can only be founded on more mature knowledge; and this can only be reached by patient and exhaustive study of material as it comes to hand. It is undoubtedly a fact that many private collectors would gladly hand over their accumulations of entomological wealth to the National Museum if they could feel that such gifts would at once be rendered available for study in connection with an already well organised and systematically arranged series. This is sufficiently exemplified in the case of Ornithology, for although not more than about 12,000 distinct species of birds are known at the present time, a yearly average of 13,722 specimens have been received in the Museum in the decade referred to, the majority being

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large faunistic collections already named and arranged by the donors.

The Mammals received during the same period average annually 451; Mollusca, 3276; Reptiles and Fishes, 1885—in about equal proportions for each; Vermes and Radiata, 2419.

We have noticed the present rate of accumulation in the Entomological Section of the Department, involving as it does constant re-arrangement and re-adjustment in the various cabinets.

The staff employed in this section has been gradually increased, and a few months ago consisted of one assistant-keeper, three assistants, and three boys, who are employed in relaxing and setting specimens, preparing labels, and so forth. This staff has lately been increased by two more assistants and one temporary assistant, giving a regular staff of six skilled entomologists to deal with properly prepared specimens. Their duty is to classify, label, and incorporate, say 20,000 insects of all orders, or over 3,300 to each worker in about 270 working days in each year. Out of this number they have to rightly name, by careful study of specimens and scattered descriptions, a considerable proportion of unnamed material; to describe and classify all that are new to science; and at the same time to keep the general collections in good condition and up to date as far as possible in sequence and arrangement. Now it must be remembered, that nearly half the time of these assistants is taken up by students and visitors, who require to have access to the collections, and who are dropping in at every hour and half-hour of each day to identify specimens or to seek information upon various subjects. This is a constant interruption to regular and continued study, and does far more to vitiate the results of honest application than any mere curtailment of the time devoted to it. In spite of such interruptions, there would probably be no difficulty in putting away in their proper places the dozen or more specimens that would fall to the daily share of each worker. But, bearing in mind that every year considerably over 5000 new species are added to the general lists, it becomes a

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very difficult matter to search through the literature of the subject, increased, according to Dr. Sharp's estimate, by 20,000 pages annually, to determine which of the unnamed specimens is or is not already described, and rightly to classify the novelties under some recognised system, especially in certain branches of the subject is which no really satisfactory system has yet been generally accepted.

If he would avoid mistakes and re-descriptions of already known species, a lepidopterist must read, not only separate works, but innumerable periodicals and transactions and proceedings of learned societies, published in seven or more different languages. How is he to find time, in the face of all his other work, to master the details of the 78 new genera and 655 new species (exclusive of synonyms), of Australian *Œcophoridæ*, which Mr. Meyrick has added within the last five or six years to the previously described three genera and 100 species known to other authors. Yet if a box of undetermined *Œcophoridæ* comes to hand (and personally I confess to a cowardly inclination to "climb down" when I get such a box), that is what he is at once called upon to do. No doubt, if he had sufficient leisure for study, such work would greatly ease his task, but how is he to find this time and still attend to his other duties? The smaller species of Coleoptera, as well as Lepidoptera, of tropical countries, have been scarcely at all touched up to the present time; their number is legion, and when these come to hand, nine-tenths of them are usually found to be new and undescribed, involving great difficulties in generic classification.

My object is to point out that the existing means of carrying on systematic entomological work in our one great public centre of special knowledge, is by no means equal to the present demand. The authors of the 'Biology of Central America' have already employed no less than ten specialists on Coleoptera alone,—three on Lepidoptera, including themselves, and three on Diptera, in all 22 entomologists,—with every probability of adding to their number before the work can be completed; seven only have been employed on all other branches of terrestrial Zoology, and two on Botany, whereas, as I have shown, the Entomology of the whole world, as well

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as the care and arrangement of the vast national collections is entrusted to six regular workers only, with one temporary extra hand, while the number of workers in other branches, certainly rather below than above their requirements, are:—for Zoology, 7; for Botany, 6; including the keepers of the departments,—a very different proportion to that which has been found necessary by Godman and Salvin.

I have so far abstained from attempting any comparison as between the extent of entomological and botanical studies. It is difficult to arrive at any just comparison by the methods so far adopted. We have no publication exactly equivalent to the 'Zoological Record,' from which the annual amount of botanical literature can be estimated, but I am indebted to Mr. Carruthers for some valuable information, from which I will endeavour to estimate approximately the comparative position of the two studies.

Looking merely at the great mass of current literature devoted to Botany in any one year, we must guard ourselves against basing our comparison upon its amount. It is almost impossible to eliminate for this purpose, an enormous proportion of published matter which treats rather of economic than of systematic Botany. The cultivation of horticultural varieties and the commercial uses of plants and drugs, which occupy the main part of numerous periodicals and works on botanical subjects, have but little counterpart in Entomology, and we shall therefore more safely base our calculation upon the ascertained extent of systematic Botany, and upon the proportion which it bears to zoological and entomological science so far as we are in possession of the necessary data. Mr. Carruthers, basing his figures upon 'Durand's Index to Bentham and Hooker's Genera of Phanerogamous Plants,' which reach 8349, and upon the numbers given by Baker and others for cryptogams, places the approximate numbers of known and described species as follows:—

Phanerogams (1888)		100,220
Cryptogams.		
Vascular (1889)	4,177	
Hepatics (1844)	2,500	
Mosses (1875)	7,700	

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Lichens	(1872)	. . . 6,250	
Algæ	(1889)	. . . 22,478	
Fungi	(1889)	. . . 35,311	
			78,416
			178,686

And having regard to the dates at which these estimates have been made by various authors, he expresses his conviction that the good species described and recognised by authors well acquainted with the subject up to the present time are over 300,000, as against from 200,000 to 250,000 insects.

It must be remembered that Botany is a much older and more advanced study than Entomology; the vegetable productions of the earth are at this moment far better known, worked out, and systematised than are the insects, and therefore the proportionate amount of labour involved in classifying and incorporating into any collection a given number of botanical specimens (except, perhaps, in the case of the more obscure cryptogams) is less than would be involved in dealing with the same number of insects, of which a far larger percentage would certainly be new and undescribed.

This point can, I think, be very fairly illustrated by observing the comparative numbers of plants and insects dealt with in the 'Biologia Centrali-Americana,' to which I have already referred. In that publication, dealing, as I have said, with an area of less than 100,000 square miles, the number of plants enumerated are 12,233, of which 607, or rather less than 2½ per cent., are cryptogams; but in this enumeration algæ, lichens, and fungi are excluded. If we take the proportion of these on the basis of Mr. Carruthers' figures, we should add 21 per cent., or roughly 2565, for these groups, by which we arrive at an estimate of about 14,800 known species in the Botany of that region, of which about 440 are new, as against over 30,000 species of insects, of which some 14,000 will probably be found to be new when all are worked out. I think it would be safe to conclude that each plant throughout the world nourishes on an average at least two distinct species of insects, although, of course,

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many insects feed upon a number of different plants, and the average per plant would be much higher if we were to count the same insects twice over. The annual additions to the botanical lists can scarcely be estimated at above 3500, but it will be evident that the field of work in Botany more nearly approaches that of Entomology in magnitude than does that of any other branch of Biology. If the means placed at the disposal of the Trustees were sufficient for the purpose, it would, I think, be a source of general satisfaction that our popular and, as I have shown, useful branch of science should be placed on the same footing as the sister science of Botany, by having, in our National Museum, a separate department to itself. It is certain that at least three times the number of the present staff are required to deal with the subject in any complete and satisfactory manner.

This change, combined with the annual publication of small systematic monographs of families, subfamilies, or even genera of insects, with full structural details to explain their classification, would, I think, tend greatly to advance our favourite study; but a free expression of representative opinion would be required to secure such an application of the necessary public funds. In the meanwhile private enterprise, with the assistance of learned societies such as our own, can do much by setting the necessary example of good monographic work, and I would urge this object strongly upon the Fellows of the Entomological Society. Such work has not been neglected by them in the past, and is probably less likely to be neglected in the future, if they can feel that by giving it their attention they may be setting the right example, and laying down the lines for good systematic entomological work in our great public department of zoological research. In this connection it gives me great pleasure to notice the 'Revisio Insectorum Familiæ Mantidarum,' which affords abundant evidence of undiminished vitality and industry on the part of our veteran Hon. Life-President, Professor Westwood.

It is usual on these occasions to mention the names of those Fellows of the Society who have died during the past

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year. I find that we have lost one Honorary Fellow, and three others.

Dr. Victor Signoret, for more than forty years a most indefatigable worker in Scientific Entomology, whose name is specially well known in connection with the study of Hemiptera, was elected an Honorary Fellow in 1882, and died last April at the age of 72.

Mr. Frederick Bond, who died in August last, joined our Society so long ago as 1841, and was personally known to many of us, and highly esteemed as one of the most observant of British naturalists. I can testify from my own grateful experience that he was ever ready to assist his friends with such information as his excellent memory and well-arranged collections enabled him to impart.

Monsieur Jacques C. Puls, who died at Ghent in January, joined the Society in 1870, and was an authority upon Hemiptera. His vast entomological library has lately been dispersed at very remarkable prices.

We have also lost Colonel C. J. Cox, who had been a member of the Society since 1858.

The following distinguished entomologists, who were not Fellows of this Society, have also died during the past year, *viz.*:—Mons. J. B. Géhin, the Rev. H. J. Gore, Pastor August Emil Holmgren, Herr Théodor Kirsche, Dr. Franz Löw, Prof. Wm. Ramsay McNab, M.D., Dr. Karl Edward Venus, founder of the Dresden 'Iris,' and the Rev. J. G. Wood.

I have now only to conclude by thanking the Fellows of the Society for the patience with which they have accorded me their kind attention, and for the friendly courtesy they have shown me during the year in which I have had the honour of being their President.

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Explanation of Plate III.

♀ *Pseudægeria squamicornis*, F. & R.

1, natural size.

2, enlarged.

3, side view.

4, neuration.

5, head, front view.

6, head, side view.

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Pseudægeria.

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Explanation of Plate V.

1 *Eretmocera basistrigata*, Wlsm.

1, natural size.

2, enlarged.

3, side view.

4, neuration.

5, head, front view.

6, head, side view.

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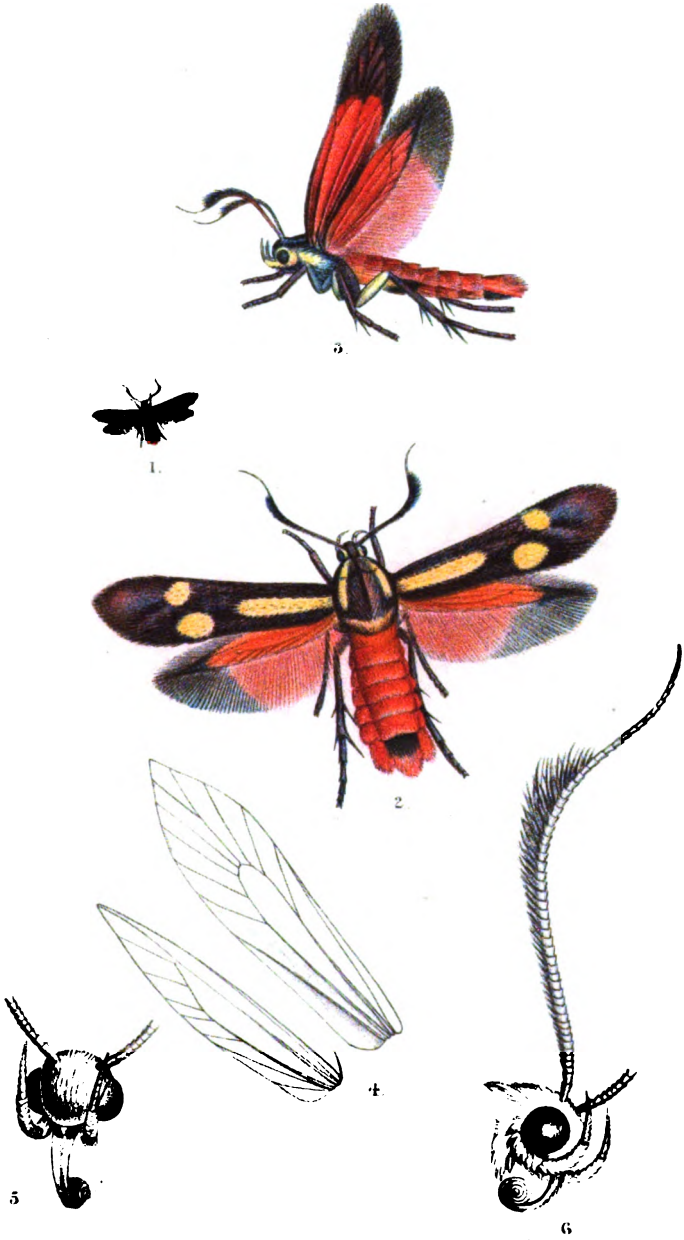

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Eretmocera.

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1. *Tinægeria fasciata*, Wlk.
2. ,, *basalis*, Wlk.
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20. ,, *medinella*, Stgr.

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Species of Tinaegeria, Eretmocera &c.

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Lepidoptera, from Kiukiang

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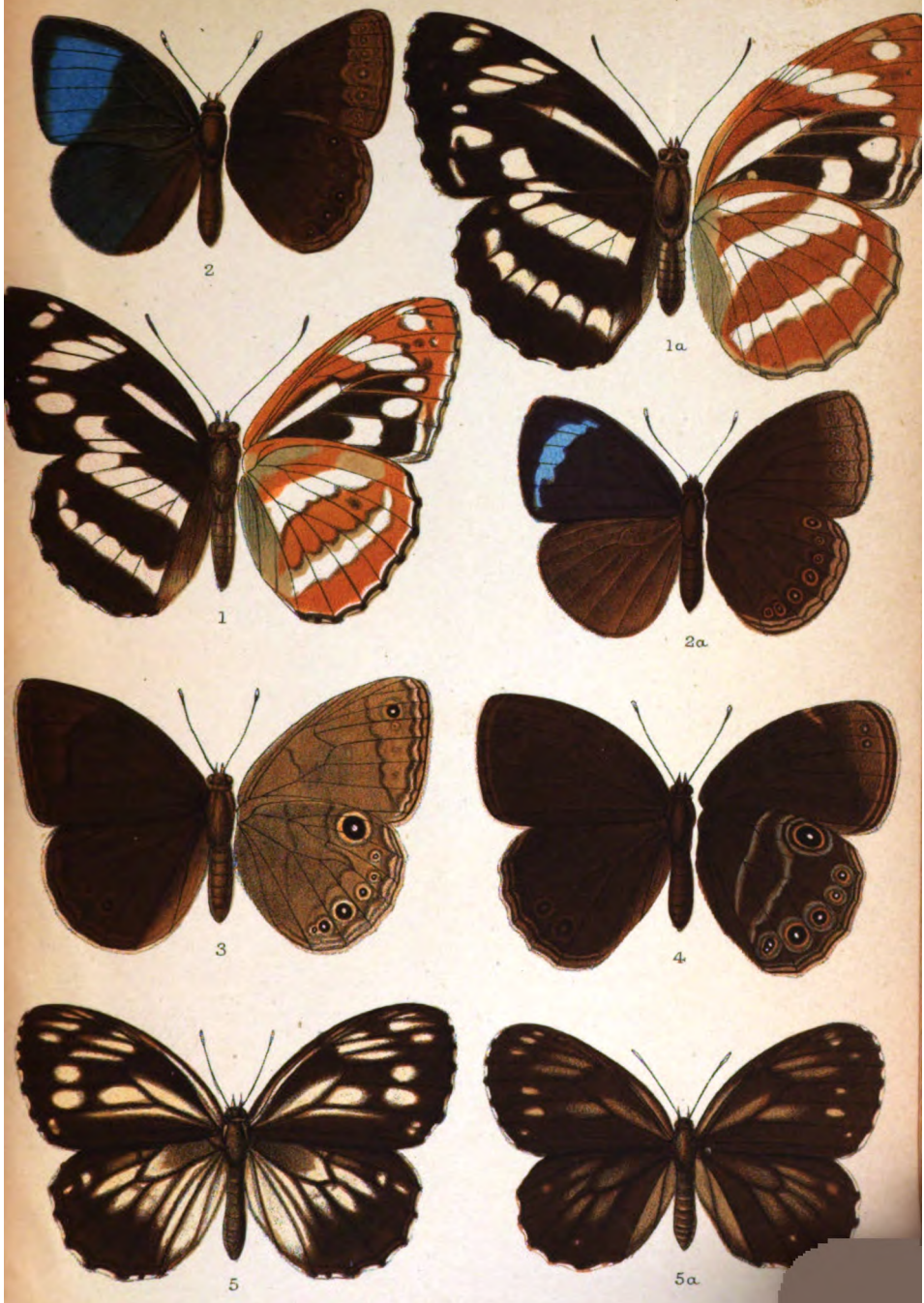

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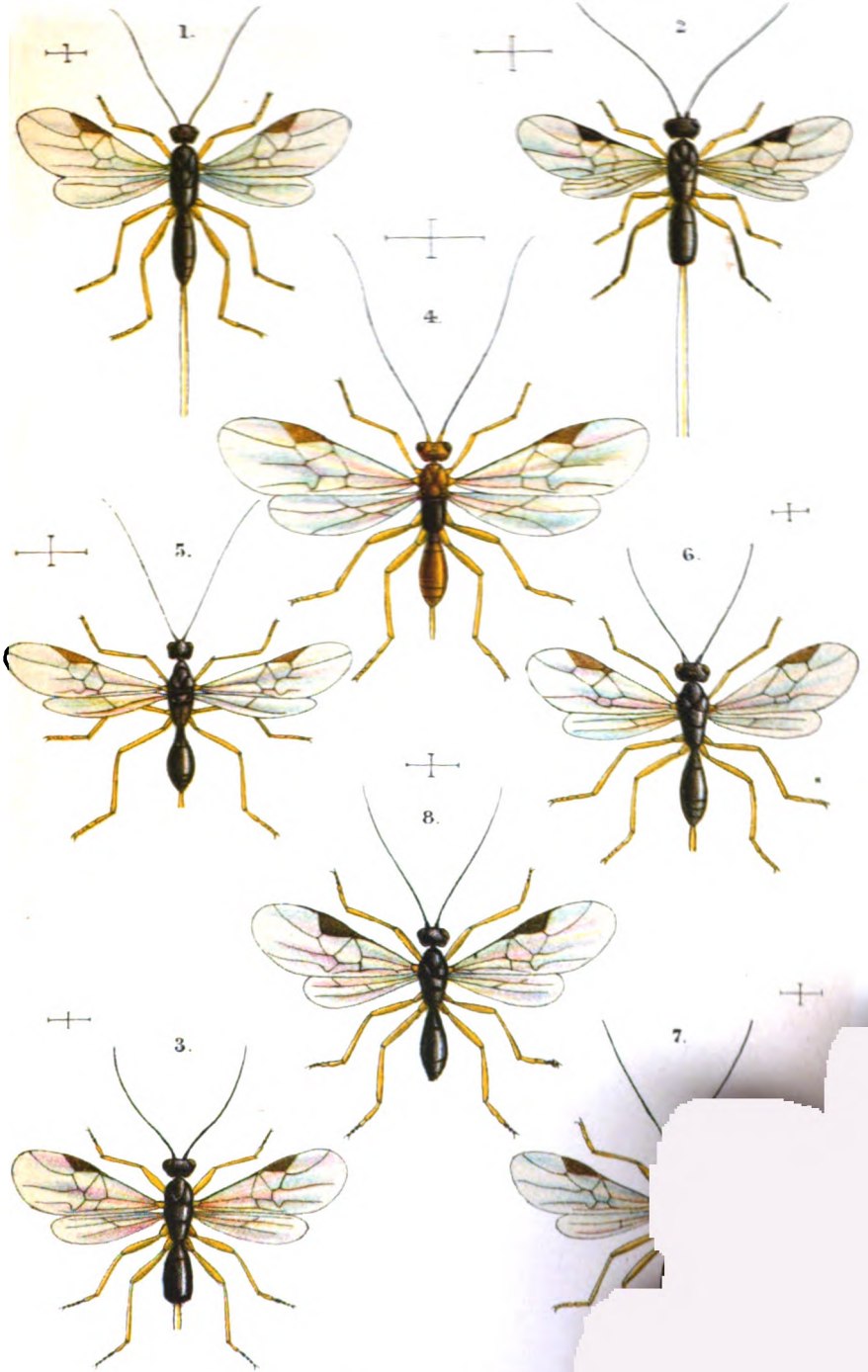

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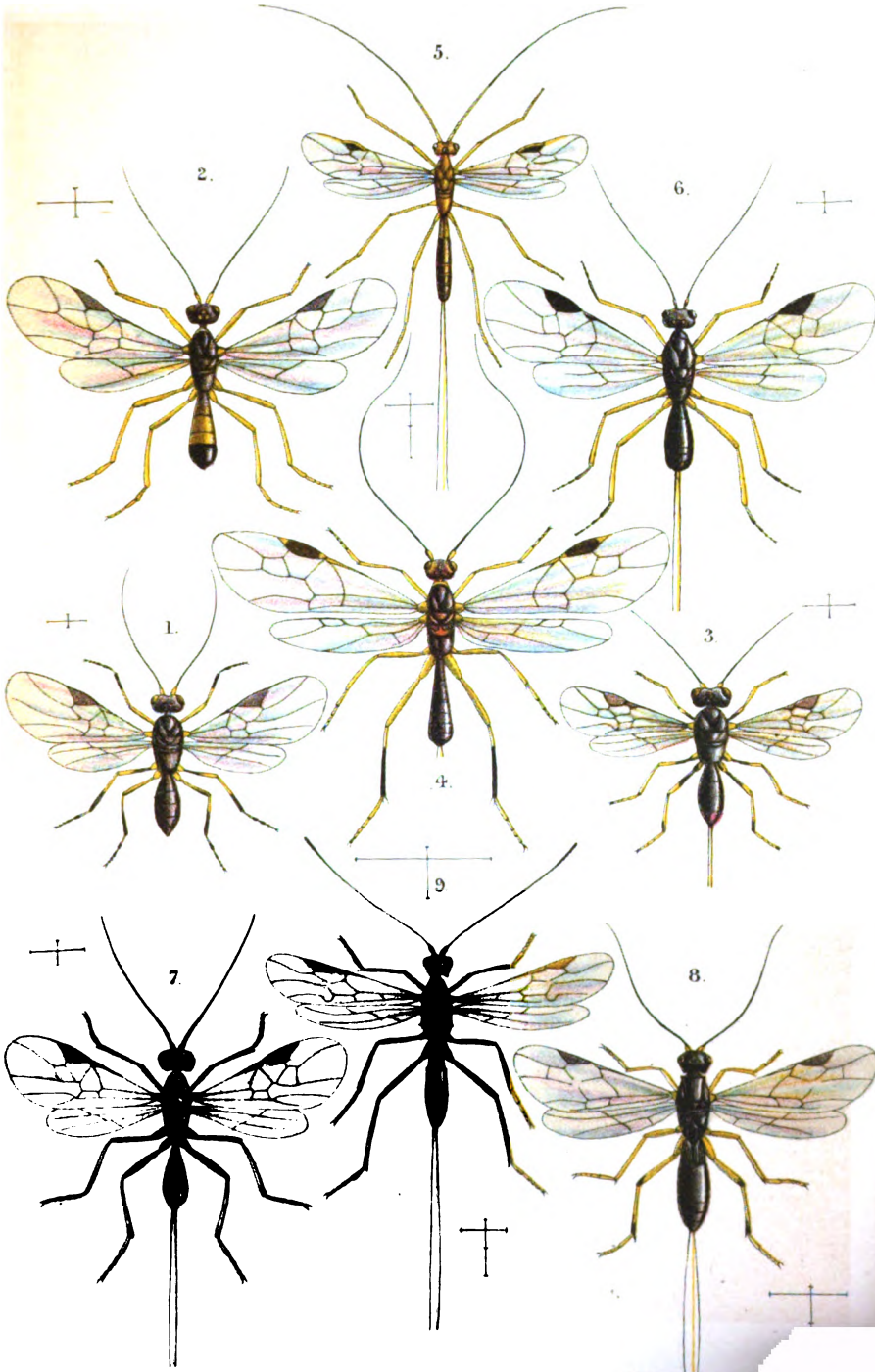

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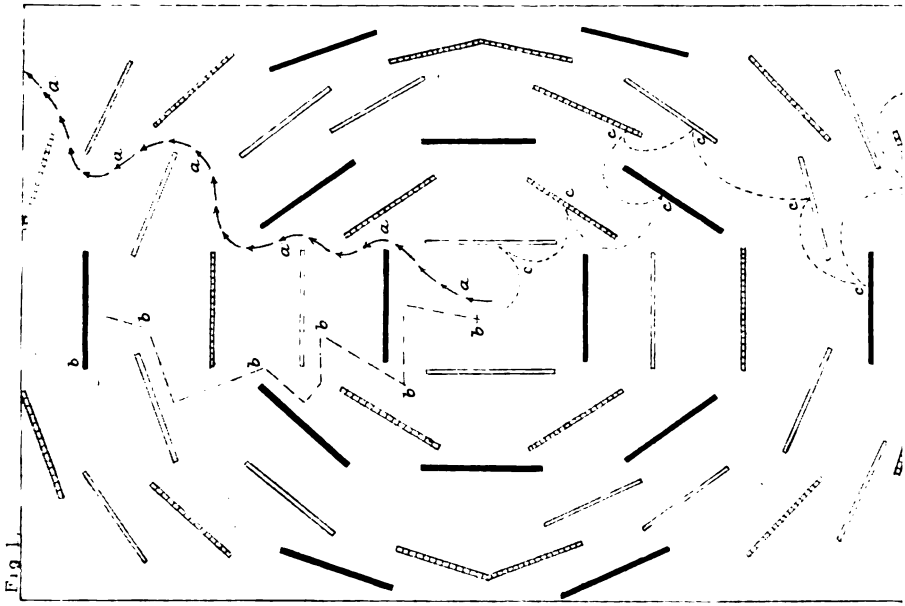

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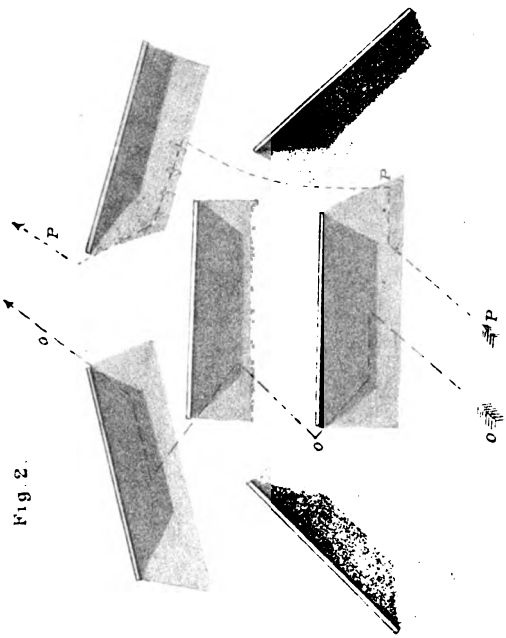

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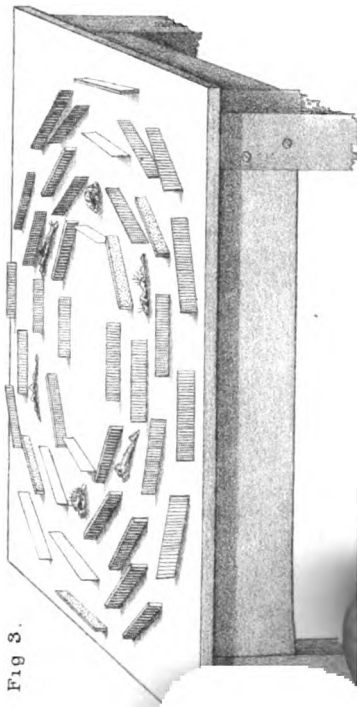

Fig 3.

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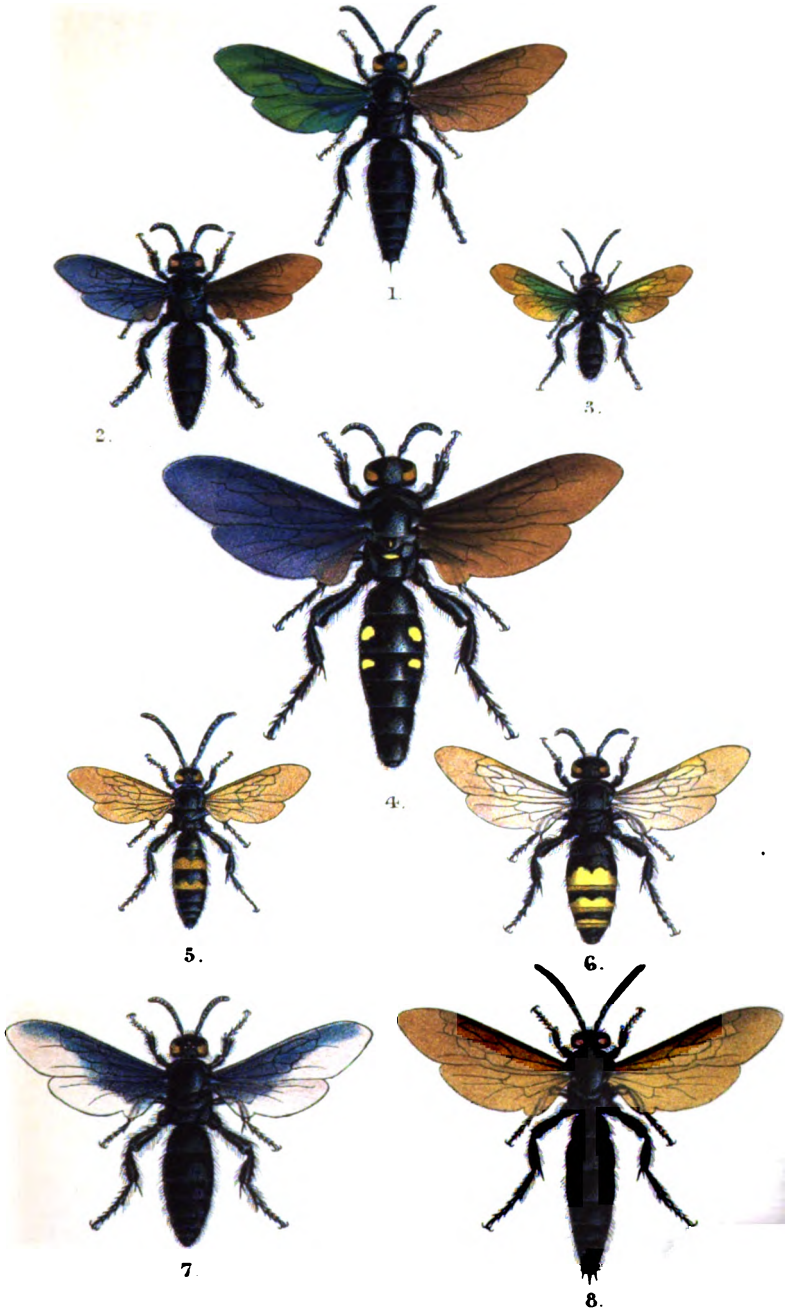

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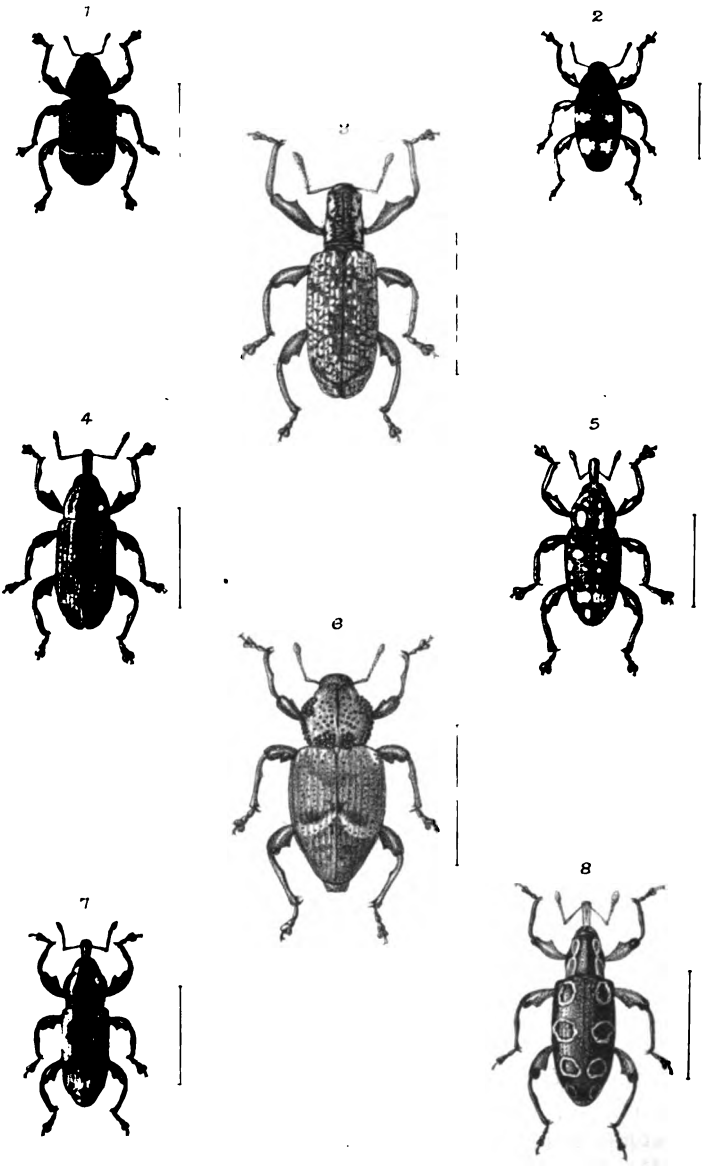

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New Species of Hilipus.

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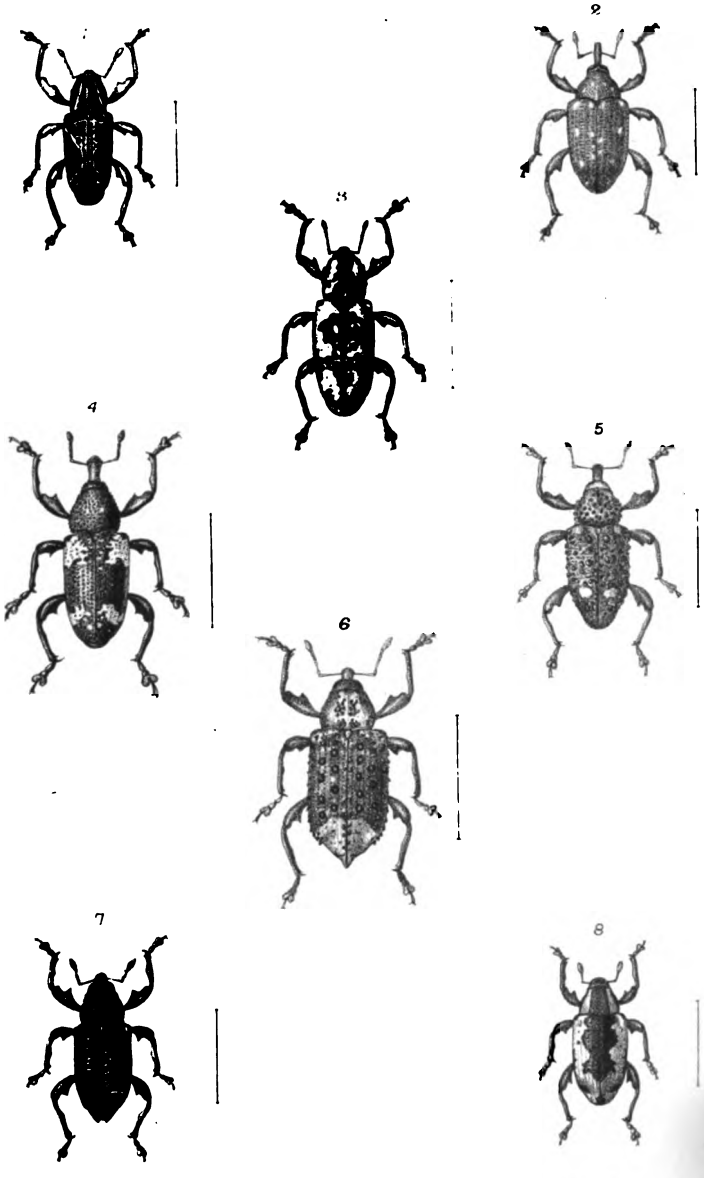

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